

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
FACULDADE DE ODONTOLOGIA
PROGRAMA DE PÓS-GRADUAÇÃO - NÍVEL MESTRADO
ÁREA DE CONCENTRAÇÃO CLÍNICA ODONTOLÓGICA
ÊNFASE EM DENTÍSTICA/CARIOLOGIA

NAILÊ DAMÉ TEIXEIRA

**EPIDEMIOLOGIA DO TRAUMATISMO DENTÁRIO
EM ESCOLARES DE 12 ANOS DE PORTO ALEGRE - RS - BRASIL**

Porto Alegre (RS), outubro de 2011

NAILÊ DAMÉ TEIXEIRA

**EPIDEMIOLOGIA DO TRAUMATISMO DENTÁRIO
EM ESCOLARES DE 12 ANOS DE PORTO ALEGRE – RS – BRASIL**

Dissertação apresentada ao Programa de Pós-Graduação em Odontologia como parte dos requisitos obrigatórios para a obtenção do título de Mestre em Clínica Odontológica com ênfase em Dentística/Cariologia.

Orientação: Prof^a. Dr^a. Marisa Maltz

Linha de Pesquisa: Epidemiologia, etiopatogenia e repercussão das doenças da cavidade bucal e estruturas anexas

Porto Alegre (RS), outubro de 2011

Agradeço imensamente aos meus pais, Hermano e Maria Teresa, pelo empenho na busca da melhor formação para seus filhos. Sua dedicação e apoio em nossa educação possibilitaram mais esta conquista, um grande sonho para mim. Além disso, tive a segurança de que, se esta experiência desse errado, eles estariam de braços abertos para me acolher.

Agradeço, também, à minha irmã Maitê, meu exemplo de profissional, mulher guerreira, ao meu irmão Iberê, pelo cuidado que sempre teve comigo. Também ao meu cunhado Marcus e, em especial, ao meu amado sobrinho Vinicius.

Aos meus avós Cleto e Maria Helena, pelos exemplos que me tornaram uma pessoa melhor, principalmente por ensinarem-me a importância da família e dos amigos na nossa caminhada. Aos meus tios: Glenio, Margarida, Lourdes, Maria Luiza, José Antônio e Josiane. Aos meus queridos primos: Renan, Bernardo e Isabela. Essas pessoas são meu porto seguro.

Aos meus padrinhos: Juca e Elisa e às primas Márcia e Clarissa, pelas dicas para minha sobrevivência em Porto Alegre.

Aos amigos de sempre: Luana, Ramiro, Júnior, Murilo, Rosana, Marcele e Mônica. Mesmo com a distância, essas pessoas me concederam apoio para este mestrado acontecer.

Como não poderia deixar de ser, agradeço aos sujeitos dessa pesquisa: alunos examinados em seus horários de aula e, também, às suas famílias por consentirem a participação. Cada aluno participante contribuiu imensamente com a ciência. Além deles, agradeço aos professores e funcionários das 42 escolas visitadas, os quais tiveram paciência em mudar sua rotina para nos receber nos dias de exame.

À professora Marisa Maltz, minha orientadora, pelo exemplo de pesquisadora e pelo incomensurável ensinamento.

À doutoranda Luana Severo Alves, companheira de pesquisa, por sua desmedida dedicação para que obtivéssemos os melhores resultados possíveis, desde a elaboração do projeto inicial até a submissão dos manuscritos aos periódicos. A partir deste trabalho, construímos uma grande amizade, que, com certeza, irá perdurar para toda vida.

Ao professor Cristiano Susin, colaborador deste trabalho, que se reuniu diversas vezes conosco, via teleconferência, para realização das análises estatísticas.

Ao professor Thiago Ardenghi, pela colaboração nas avaliações do artigo sobre qualidade de vida.

Aos queridos professores da Universidade de Santa Cruz do Sul, por contribuírem para minha formação como cirurgiã-dentista e pelo grande incentivo para que eu conquistasse o sonho de ser Mestre.

Ao grupo de pesquisa em Cariologia da UFRGS, em nome das professoras: Clarissa Fatturi Parolo, Lina Hashisume, Sandra Henz, Berenice Barbachan e Silva, Juliana Jardim e Iriana Zanin; pós-graduandos Roberta Garcia, Luciana Firmino, Maurício Moura e Júlio Zenkner; e técnicas de laboratório Tânia Peres e Luisa Mercado. Também agradeço a todos os alunos de Iniciação científica que passaram pelo LABIM nestes dois anos.

Aos colegas da turma de Mestrado do PPG Odontologia da UFRGS - 2009/2011, pela diversão em que transformaram estes anos de convivência e muita dedicação.

Aos alunos de graduação que de alguma forma envolveram-se neste projeto: Nicolle Ranzan, Natália Bertella, Vanessa Soares, Sílvia Boit, Gabriela Goldenfum, Fernanda Milanesi, Débora Budke, Clarissa Limas, Liana Webber, Alessandra Damo, Janaína Pedrini, Caroline Weber e Caroline Sarti.

Ao motorista Edson Silva, pelo cuidado que teve com nosso transporte para as mais diversas localidades de Porto Alegre.

À professora Rita de Cássia Oliveira Pogozelski, pelas correções do texto em língua portuguesa.

À PROPESQ (Pró-Reitoria de Pesquisa) da UFRGS, pelo apoio emergencial concedido a esta pesquisa. À Colgate-Palmolive, pela doação de escovas e cremes dentais.

Ao Programa de Pós-graduação em Odontologia da UFRGS.

À CAPES, pelo financiamento.

"Quem parte é quem sabe para onde vai

Quem escolhe o seu caminho

E mesmo que não haja caminho

Porque o caminho se faz a andar

O sol, o vento, o céu e o cheiro do mar são os nossos guías

A única companhia:

A certeza que fizemos bem e que não podia ser de outra maneira"

(Margarida Rebelo Pinto)

RESUMO.....	9
ABSTRACT.....	11
REVISÃO DE LITERATURA.....	13
Prevalência, severidade e extensão do traumatismo dentário na dentição permanente em crianças e adolescentes.....	15
Sistemas de classificação para traumatismo dentário.....	18
Fatores associados ao traumatismo dentário.....	21
Tratamento de traumatismo dentário: um problema de saúde pública.....	26
Impacto do traumatismo dentário na qualidade de vida.....	29
OBJETIVOS.....	31
Objetivo geral.....	31
Objetivos específicos.....	31
ARTIGO I: “Traumatic dental injury among 12-year-old South Brazilian schoolchildren: Prevalence, severity and risk indicators”.....	32
ARTIGO II: “Traumatic dental injuries with treatment needs negatively impact quality of life of Brazilian schoolchildren”.....	54
CONSIDERAÇÕES FINAIS.....	71
REFERÊNCIAS.....	73
ANEXOS.....	79

Quadro 1 - Prevalência internacional de traumatismo dentário na dentição permanente, de 1997 a 2011.....	16
Quadro 2 - Prevalência de traumatismo dentário na dentição permanente no Brasil, 2001 a 2010.....	17
Quadro 3 - Sistemas de classificação de traumatismo dentário.....	20

ARTIGO I

<i>Table 1.</i> Frequency distribution, prevalence and severity of traumatic dental injury by demographic, socioeconomic, and physical characteristics in 12-year-old schoolchildren in Porto Alegre, Brazil.....	51
<i>Table 2.</i> Prevalence of traumatic dental injury by demographic, socioeconomic, and physical characteristics in 12-year-old schoolchildren in Porto Alegre, Brazil.....	52
<i>Table 3.</i> Effect of socioeconomic status on severity of traumatic dental injury in 12-year-old schoolchildren in Porto Alegre, Brazil.....	53

ARTIGO II

<i>Table 1.</i> Frequency distribution of sample by sociodemographic, and clinical characteristics in Brazilian schoolchildren.....	68
<i>Table 2.</i> Distribution of domain-specific and overall CPQ ₁₁₋₁₄ scores according to treatment condition regarding TDI.....	69
<i>Table 3.</i> Association between domain-specific and overall CPQ ₁₁₋₁₄ scores and treatment condition regarding TDI in Brazilian schoolchildren.....	70

Objetivo: O objetivo dessa dissertação foi identificar a prevalência, severidade, indicadores de risco e impacto na qualidade de vida do traumatismo dentário em escolares de 12 anos de Porto Alegre, RS – Brasil.

Métodos: Essa pesquisa fez parte de um estudo observacional transversal analítico desenvolvido para avaliar a saúde bucal de escolares de 12 anos. A coleta de dados foi realizada no período de setembro de 2009 a dezembro de 2010. Participaram alunos regularmente matriculados e frequentando a escola, nascidos no ano de 1997 e 1998 (12 anos completos até o final do ano do exame - 2009 ou 2010). Dois questionários foram utilizados: um destinado aos pais/responsáveis legais (questões socioeconômicas, acesso a serviços odontológicos, etc.) e outro respondido pelos próprios escolares (hábitos comportamentais e *Child Perceptions Questionnaire* – CPQ₁₁₋₁₄ – instrumento que visa avaliar o impacto das condições de saúde bucal na auto-percepção e qualidade de vida). A sistemática do exame clínico foi: aferição do peso e altura, determinação do índice de sangramento gengival, índice de estética dental, índice de traumatismo dentário e índice de cárie dentária. Os exames foram realizados por duas examinadoras previamente treinadas e calibradas (ICC e Kappa \geq 0,7). A associação entre traumatismo dentário e seus possíveis indicadores de risco foi avaliada através de modelos de regressão de Poisson. A associação entre os escores do CPQ₁₁₋₁₄ e traumatismo dentário foi investigada através de modelos de regressão de

Poisson, utilizando gênero, nível socioeconômico e os índices de cárie e estética dental como variáveis de ajuste. *Resultados:* Foram examinados 1528 alunos, sendo 18,8% de escolas particulares (n=9) e 81,1% de escolas públicas (n=33), obtendo-se uma taxa de resposta de 83%. Uma alta prevalência de traumatismo dentário foi encontrada na população em estudo (34,77%), porém, na maioria dos casos observou-se a presença de traumas leves (24,37%). Além disso, observou-se associação de traumatismo dentário com variáveis sócio-demográficas e ano escolar. Em relação ao impacto na qualidade de vida, foi encontrada uma maior média de CPQ₁₁₋₁₄ no domínio limitação funcional, nos indivíduos que apresentavam traumatismo dentário não tratado, quando comparados com os indivíduos que não apresentavam traumatismo dentário ou apresentavam traumatismo sem necessidade de tratamento. *Conclusões:* O presente estudo demonstrou que o traumatismo dentário é um agravo prevalente e que, quando não tratado, apresenta um comprometimento nas funções orais.

Palavras-chave

Traumatismo dentário, epidemiologia, indicadores de risco, qualidade de vida

Aim: Identify the prevalence, severity, risk indicators and impact on quality of life of traumatic dental injury among 12-year-old schoolchildren in Porto Alegre, Brazil. *Methods:* This study is a part of a cross-sectional survey developed to assess the oral health status of 12-year-old schoolchildren, carried out from September 2009 to December 2010. The eligibility criteria were students attending in selected schools, born in 1997 and 1998. Two questionnaires were used: one for parents/ legal guardians (socioeconomic questions, access to dental services, etc.); and one for schoolchildren (behavioral habits and Child Perceptions Questionnaire - CPQ₁₁₋₁₄). The clinical examination was performed as follows: measurement of height and weight, record of the gingival bleeding index, dental esthetics index, dental trauma index and dental caries index. The examinations were performed by two examiners previously calibrated (ICC and Kappa \geq 0.7). The association between traumatic dental injury and the possible risk indicators was assessed using Poisson regression. The association between CPQ₁₁₋₁₄ scores and traumatic dental injury was assessed using Poisson regression (gender, socioeconomic status, dental caries index, and dental aesthetics index were used as adjustment variables). *Results:* We examined 1528 students - 18.8% of private schools (n = 9) and 81.1% of public schools (n = 33), yielding a response rate of 83%. A high prevalence of dental traumatic injury was found in this population (34.77%), being mild trauma in most cases (24.37%). Also, association between traumatic dental injury and socio-demographic

characteristics and school year was found. Regarding the impact on quality of life, we found a higher average CPQ₁₁₋₁₄ in the domain functional limitation in individuals with untreated traumatic dental injury when compared to individuals who had no trauma or trauma without treatment need. *Conclusions:* This study showed that traumatic dental injury is prevalent and, when treatment is neglected, oral functions may be impaired.

Keywords

Traumatic dental injury, dental trauma, epidemiology, risk indicators, quality of life

Traumatismo dentário é definido como injúria de natureza térmica, química ou física que afete um dente (1). Diferente de outras partes do organismo, o trauma em um dente não possui reparo biológico (1). O aumento da violência, do número de acidentes de trânsito e da participação das crianças em atividades esportivas, contribui para que o traumatismo dentário possa ser um problema de saúde pública, dessa forma, uma futura elevação da prevalência poderá ocorrer devido ao maior número de pessoas em risco (2, 3).

As evidências indicam que, o traumatismo dentário é um significativo problema em jovens (4). Um estudo retrospectivo realizado no setor de emergência de um hospital no Recife – PE examinou todos os pacientes que procuravam o serviço no período de 1997 a 1999, encontrando a maior prevalência de traumatismo dentário na faixa etária dos seis aos quinze anos, concluindo que crianças e jovens sofrem mais traumatismo dentário do que adultos ou idosos (4). Outro estudo avaliou crianças, adolescentes e adultos jovens, de 2 a 21 anos, em um serviço de traumatologia no Chile e constatou que a idade com maior prevalência de traumatismo dentário fica entre 10 e 12 anos (5).

Em relação ao local de ocorrência, estudos mostram dados semelhantes na experiência de traumatismo dentário ocorridos em casa, na

rua, na escola, em parques ou praças (4, 6-10). O traumatismo dentário está comumente relacionado a quedas e colisões (com objetos ou outras pessoas), acidentes de trânsito, prática de esportes (incluindo contato com piscinas, bicicletas, patins, etc.), brincadeiras, alimentação e violência (4, 7-12). Casos menos comuns podem ocorrer ocasionados por iatrogenias em procedimentos hospitalares que exijam intubação, abuso físico na infância, choques inespecíficos, tonturas, alterações psíquicas ou consequentes do uso de drogas e epilepsia (13).

Prevalência, severidade e extensão do traumatismo dentário na dentição permanente em crianças e adolescentes

No que se refere à prevalência de traumatismo dentário, estudos em jovens mostraram uma expressiva diferença entre os dados encontrados, variando de 5,3% a 34,0% nos estudos internacionais (quadro 1) e de 10,5% a 58,6% nos estudos brasileiros (quadro 2). A maioria dos estudos mostra uma prevalência em torno de 20% (2, 9, 14-23). Porém, na África do Sul (24), Índia (25) e Laos (26) foram encontradas baixas prevalências (em torno de 6%). Por outro lado, a prevalência de traumatismo dentário encontrada em um estudo conduzido em Blumenau – SC foi de 58,6% (27), considerada alta quando comparada a outros estudos brasileiros com metodologia semelhante (22, 23, 28). Esta diferença de prevalências pode estar relacionada à diferença de ambiente, cultura e locais estudados, métodos de realização dos exames e classificação utilizada para avaliação de traumatismo dentário (29).

No que se refere ao dente mais comumente afetado, é unânime que os incisivos centrais superiores têm as mais altas taxas de ocorrência (3, 4, 7, 8, 12, 28) e, na maioria dos casos, os indivíduos apresentam lesão em apenas um dente (8, 28-30). Fraturas em esmalte e trincas são as injúrias mais ocorrentes, seguidas de fraturas coronárias envolvendo esmalte e dentina (7-10, 12, 28, 31). Avulsão e fraturas alveolares são os tipos de traumatismo dentário menos frequentes (31).

Quadro 1 - Prevalência internacional de traumatismo dentário na dentição permanente, de 1997 a 2011

<i>Autores</i>	<i>Local</i>	<i>Ano</i>	<i>Idade (anos)</i>	<i>Critério utilizado</i>	<i>Amostra (N)</i>	<i>Prevalência (%)</i>
Al-Majed <i>et al.</i> (14)	Arábia Saudita	2001	12-14	Índice próprio	862	34,0
Altun <i>et al.</i> (15)	Turquia	2009	6-12	Andreasen	4.956 (62% de 12 anos)	9,5 (13.1 aos 12 anos)
Artun <i>et al.</i> (16)	Arábia	2005	12-14	Índice próprio	1.583	14,5
David <i>et al.</i> (25)	Índia	2009	12	O'brien	838	6,1
Hamdam <i>et al.</i> (32)	Jordânia	2003	12	Ellis	1.878	13,8
Jürgensen, Petersen (26)	Laos	2009	12	OMS	621	7,0
Locker <i>et al.</i> (17)	Ontário - Canadá	2005	12-14	CDHS-UK	3.010	18,5
Marcenes <i>et al.</i> (33)	Damascus - Síria	1999	12	CDHS-UK	162	11,7
Marcenes, Murray (2)	Londres - Inglaterra	2001	14	CDHS-UK	2.684	23,7
Naidoo <i>et al.</i> (29)	África do Sul	2009	12	Ellis	1.072	5,3
Navabazam, Farahan (34)	Irã	2010	9-10	Ellis	1.440	27,5
Petti <i>et al.</i> (35)	Roma - Itália	1997	6-11	Garcia-Godoy	938	21,3
Sgan-Cohen <i>et al.</i> (6)	Jerusalém - Israel	2005	9-13	Garcia-Godoy	1.195	16,1 leves 13,5 severos
Taiwo <i>et al.</i> (20)	Nigéria	2011	12	OMS	719	15,2

Quadro 2 – Prevalência de traumatismo dentário na dentição permanente no Brasil, 2001 a 2010

<i>Autores</i>	<i>Local</i>	<i>Ano</i>	<i>Idade (anos)</i>	<i>Critério utilizado</i>	<i>Amostra (N)</i>	<i>Prevalência (%)</i>
Cavalcanti (12)	Campina Grande - PB	2009	12	Cortes Andreasen O'brien	72	36,1
Cortes, Marcenes, Sheiham (28)	Belo Horizonte - MG	2001	12	CDHS-UK	649	13,6
Grimm <i>et al.</i> (21)	São Paulo (131 cidades)	2004	5-12	OMS	73.243	24,0
Marcenes, Zobot, Traebert (27)	Blumenau - SC	2001	12	CDHS-UK	652	58,6
Nicolau, Marcenes, Sheiham (11)	Cianorte - PR	2001	13	CDHS-UK	764	20,4
Soriano <i>et al.</i> (7)	Recife - PE	2007	12	Andreasen	1.046	10,5
Traebert <i>et al.</i> (9)	Florianópolis - SC	2003	12	O'brien modificado	307	18,9
Traebert <i>et al.</i> (22)	Herval d'Oeste - SC	2006	12	CDHS-UK	297	17,3
Traebert <i>et al.</i> (23)	Palhoça - SC	2010	12	CDHS-UK	405	22,5

Diversos sistemas de classificação (ou índices) para medir traumatismo dentário têm sido propostos. O quadro 3, compara os índices mais comumente utilizados.

O sistema proposto por Andreasen (1), o mais frequentemente usado (36), inclui três grandes grupos de lesões (trauma em dentes, em estruturas de apoio e em tecidos moles) e os subdivide em 16 categorias. Este índice é mais difícil de ser utilizado em estudos populacionais na medida em que, muitas vezes, há necessidade de diagnóstico complementar para a diferenciação entre diferentes categorias, além de ser um índice bastante complexo.

Já o sistema de classificação proposto pela Organização Mundial da Saúde (OMS) congrega diferentes tipos de traumatismo dentário na mesma categoria e permite o mínimo de interpretação subjetiva, agregando as lesões periodontais em apenas um grupo e subdividindo o traumatismo em menos categorias (10 categorias) (37, 38). Garcia-Godoy propõe uma modificação do sistema OMS, que permite separar fraturas dentárias naquelas envolvendo cimento ou não (37, 39). O sistema de classificação de Ellis é bastante semelhante ao sistema de Garcia-Godoy, diferenciando-se por classificar fraturas como "simples" ou "extensas" ao invés de diferenciá-las pelo tipo de tecido envolvido (37).

O sistema de classificação *The Children's Dental Health Survey criteria* - CDHS-UK vem sendo amplamente utilizado em estudos epidemiológicos (2, 17, 22, 23, 27, 28, 33). Trata-se de um índice utilizado em pesquisas no Reino Unido, que identifica o tipo de tecido envolvido (esmalte, dentina ou polpa) em seis categorias. Não discrimina danos em tecidos de suporte ou tecidos moles, visto que, estes danos são de difícil diagnóstico em pesquisas populacionais. Os danos, quando identificados, são incluídos em uma única categoria. Para o uso em estudos epidemiológicos, este índice é adequado por ser simples e de fácil execução (40).

Quadro 3 – Sistemas de classificação de traumatismo dentário, modificado de Bastone (37)

SISTEMA DE CLASSIFICAÇÃO	Andreasen	Organização Mundial da Saúde	Garcia-Godoy	Ellis	CDHS-UK
Número de grupos					
1	Fratura incompleta em esmalte	Fratura em esmalte	Trinca em esmalte	Fratura coronária simples, envolvendo pouca ou nenhuma dentina	Fratura do esmalte somente
2	Fratura coronária simples (esmalte ou dentina, sem exposição pulpar)	Fratura coronária sem envolvimento pulpar	Fratura em esmalte	Fratura coronária extensa, envolvendo dentina, mas sem exposição pulpar	Fratura em esmalte-dentina sem envolvimento pulpar
3	Fratura coronária complicada (esmalte e dentina, com exposição pulpar)	Fratura coronária com envolvimento pulpar	Fratura em esmalte-dentina sem envolvimento pulpar	Fratura coronária extensa, envolvendo dentina, com exposição pulpar	Quaisquer fratura e sinais/sintomas de envolvimento pulpar: fratura de esmalte e dentina + exposição, escurecimento ou fístula
4	Fratura corono-radicular simples (esmalte, dentina e cimento, sem exposição pulpar)	Fratura radicular	Fratura em esmalte-dentina com envolvimento pulpar	O dente tornou-se não-vital, com ou sem perda de estrutura	Sem fratura, mas com sinais /sintomas de envolvimento pulpar: sem fratura + escurecimento ou fístula
5	Fratura radicular (esmalte, dentina e cimento, com exposição pulpar)	Fratura corono-radicular	Fratura radicular	Perda total do dente	Dente perdido por trauma
6	Concussão	Fratura dentária inespecífica	Fratura dentária inespecífica	Deslocamento do dente, com ou sem fratura na coroa ou raiz	Outro dano (deve-se especificar)
7	Subluxação	Luxação	Concussão	Fratura da coroa e, massa e sua substituição	
8	Luxação intrusiva	Intrusão ou extrusão	Luxação		
9	Luxação extrusiva	Avulsão	Deslocamento lateral		
10	Luxação completa	Outra injúria, incluindo em tecidos moles	Intrusão		
11	Fratura de osso alveolar de suporte		Extrusão		
12	Fratura da parede vestibular ou lingual do osso alveolar de suporte		Avulsão		
13	Fratura da maxila ou da mandíbula				
14	Lasceração da gengiva ou mucosa oral				
15	Contusão da gengiva ou mucosa oral				
16	Abrasão da gengiva ou mucosa oral				

O reconhecimento de condições que determinem risco aumentado para desfechos em saúde é fundamental para o planejamento de estratégias de controle e tratamento de diferentes agravos nas populações (41). Através da epidemiologia, que pode ser definida como o estudo da ocorrência de doenças em populações (42), há possibilidade de identificar e caracterizar indivíduos com determinado desfecho em saúde, comparando-os com aqueles que não o apresentam. Desta forma, caracteriza-se a população que pode ter maior chance de desenvolver um agravo na saúde. Através dos estudos transversais analíticos, pode-se aferir esta chance num determinado período. Este modelo de estudo tem sido utilizado ao redor do mundo para determinar características comuns às pessoas que sofrem traumatismos dentários.

Fator de risco e indicador de risco são dois termos utilizados no estudo de fatores predisponentes de agravos em saúde. O termo “fator de risco” é definido como qualquer fator ambiental, comportamental ou biológico confirmado por sequência temporal em estudos longitudinais que, se apresentado, aumenta a probabilidade do agravo ocorrer (41). Já o uso do termo “indicador de risco” refere-se à associação entre a exposição e determinada condição, usado em estudos transversais (41).

Uma revisão sistemática da literatura evidenciou que os estudos realizados até então, não são conclusivos em relação aos fatores ambientais

e comportamentais associados ao traumatismo dentário. Um perfil de risco para os pacientes deve ser elucidado com o objetivo de controlar eventos de traumatismo dentário na população (3). Serão descritos, a seguir, alguns dos indicadores de risco associados ao traumatismo dentário.

- Gênero

Em relação ao gênero, a maioria dos estudos comprova que há diferença significativa na ocorrência de traumatismo dentário entre os gêneros, revelando maior prevalência em meninos (6, 8, 10, 11, 20, 27, 28, 43). Foram encontradas taxas de injúrias entre meninos para meninas em torno de 2:1 (16, 31). A explicação hipotética para esta associação entre gênero e traumatismo dentário é a maior participação de meninos em atividades físicas intensas, esportes de contato físico e brincadeiras com maior potencial de risco para ocorrência de acidentes (30).

- *Overjet incisal*

Uma meta-análise, realizada em 1999, avaliou 11 artigos publicados entre 1966 e 1996 e concluiu que pacientes com *overjet* >3mm tem duas vezes mais chance de sofrer traumatismo dentário do que pacientes com *overjet* <3mm. Este efeito sobre o risco de sofrer traumatismo dentário foi menor em meninos do que em meninas, no mesmo grupo de tamanho de

overjet. Além disso, esse estudo mostrou que o risco aumenta gradativamente com o aumento do tamanho do *overjet* (44).

Estudos mais recentes, publicados de 2001 a 2007, mostram associação entre *overjet* e traumatismo dentário, reconhecendo um *overjet* >5mm como um fator predisponente a este agravo (6, 7, 10, 12, 28, 30). Artun *et al.* observaram que o risco para traumatismo dentário aumenta em 13% para cada milímetro de aumento no *overjet* (16).

No que se refere à relação entre severidade do traumatismo dentário e presença de *overjet* aumentado, Sgan-Cohen *et al.* não encontraram associação entre *overjet* e casos de traumas leves (6).

- Cobertura labial inadequada (postura labial inadequada)

A associação de cobertura labial inadequada com traumatismo dentário não está bem estabelecida. Alguns estudos demonstram haver apenas uma tendência de aumento no risco de traumatismo dentário para sujeitos com esta característica (6, 27), enquanto demonstram que essa relação é significativa (12, 28, 45, 46). Porém, quando ajustado a outros fatores em modelos multivariados, não foi encontrada associação significativa entre cobertura labial inadequada e traumatismo dentário (9, 22, 43, 47). De acordo com alguns autores (30, 45), a postura labial por si só não é um importante fator predisponente ao traumatismo dentário devido a sua colinearidade com a presença de *overjet* aumentado.

Traebert *et al.* sugerem que se estabeleça um protocolo de pesquisa padrão que possibilite estabelecer a real influência do tipo de cobertura labial na ocorrência do traumatismo dentário (47).

- Obesidade

A obesidade, assim como o traumatismo dentário, também se constitui em um problema de saúde pública, pois é um evidente fator de risco para diversas doenças. Esforços vem sendo feitos para determinar a relação entre obesidade e saúde bucal. A exploração desse fator também se torna importante para traumatismo dentário.

Estudos recentes, publicados de 2001 a 2009, investigaram a relação entre obesidade ou sobrepeso e ocorrência de traumatismo dentário. A relação entre obesidade e traumatismo dentário é controversa. Enquanto alguns encontraram associação (7, 11, 48), outros demonstraram que essa relação não é significativa (30, 49, 50).

- Situação socioeconômica

A situação socioeconômica é um fator que está associado a diversos agravos orais, tais como: cárie dentária (51), doença periodontal (52), perda dentária (53) e câncer bucal (54). Entretanto, no que concerne ao traumatismo dentário, essa associação ainda não está clara (6, 11, 13, 27, 55, 56). Enquanto alguns estudos revelaram que crianças de classe social

baixa apresentam maior prevalência de traumatismo dentário (2, 46, 57, 58), outros, mostram que esta associação é inversa (crianças de classe social baixa sofrem menos traumatismo dentário) (27, 28). Uma recente revisão sistemática concluiu que, a maioria dos estudos não encontra associação entre traumatismo dentário e situação socioeconômica, visto que, um pequeno número de estudos encontrou relação entre traumatismo em dentes permanentes com situação socioeconômica baixa (55).

Tratamento de Traumatismo dentário: um problema de saúde pública

No Brasil, dados de atendimentos de um serviço de urgência odontológica de São Paulo para crianças (0 a 12 anos de idade), mostram que as lesões traumáticas foram responsáveis por 18,52% da demanda (59). De pacientes entre seis e doze anos avaliados em uma urgência na Turquia, a ocorrência de traumatismo na dentição permanente foi de 57,1% em 161 dentes examinados (31). Um estudo realizado em um hospital constatou que 51% dos atendimentos de urgência foram causados por traumatismos dentários (60). Trauma dental representou 23% das consultas de emergência em uma clínica odontopediátrica (61). Outro estudo investigou a prevalência e as características dos atendimentos odontopediátricos durante um período de cinco anos e 26,6% apresentaram queixas de traumatismo (62).

Devido a um aumento na ocorrência de traumatismo dentário, uma revisão de literatura apontou a necessidade de desenvolvimento de medidas preventivas para minimizar a ocorrência de traumatismo dentário. As medidas preventivas são a realização de tratamento precoce de *overjet* incisal e o uso de protetores bucais durante esportes de contato. Além disso, é importante a educação do público em geral sobre a gestão de primeiros socorros de traumatismo dentário (63).

As consequências das lesões dentárias traumáticas são tratamentos dispendiosos (64). No Reino Unido, menos de 20% dos dentes traumatizados

em crianças de 12 anos de idade ou menos foram tratados (65). Em estudo Canadense, um de oito incisivos com fraturas de esmalte não foram restaurados (8). Na Inglaterra, dados mostraram que 0,6 % dos incisivos traumatizados foram tratados e 2,8% dos incisivos avaliados necessitavam de tratamento e, em um segundo estudo, novos dados demonstraram que 56% de todos os dentes traumatizados necessitavam de tratamento (43, 66). Em um estudo em Damasco - Síria, observou-se necessidade de tratamento em 63,2% das crianças com traumatismo (33). Dados semelhantes vem sendo encontrados no Brasil. Em Blumenau, SC, o tratamento do traumatismo dentário foi considerado pelos autores como severamente negligenciado, pois, cerca de 96,7% dos dentes com sinais de traumatismo não estavam tratados (27).

Um estudo retrospectivo de 15 anos de acompanhamento avaliou tratamento de dentes traumatizados e os resultados demonstraram que 19% das restaurações foram substituídas mais de dez vezes e, ao final do estudo, aproximadamente 25% foram avaliadas como inaceitáveis, ou seja, que ainda necessitam de tratamento. Depois de 15 anos, 81% dos dentes reimplantados e avaliados foram extraídos (64). Outro problema grave decorrente do traumatismo dentário é a avulsão, cuja reabilitação dentária afeta a família durante anos. Como consequências da avulsão e posterior reimplante do dente, são resultados inevitáveis a anquilose, reabsorção radicular e infraoclusão (67).

Além disso, o tratamento de traumatismo dentário torna-se dispendioso para a família. Em um estudo no Canadá, a média do custo estimado para o

tratamento foi 1.465 Dólares Canadenses (cerca de R\$ 2.475,53 reais) e o tempo direto do cirurgião-dentista para o primeiro ano de acompanhamento pós-trauma foi de 72 horas. Além disso, esse estudo constatou que 90% dos pacientes e 86% dos pais relataram que foram perdidos tempo de escola e tempo de trabalho. Em relação ao tempo de tratamento de traumas não complicados na dentição decídua foi necessária uma média de 2,5 visitas e 0,8 horas, e para traumas complexos foram utilizadas 4,3 visitas e 1,6 horas por indivíduo. Para os dentes permanentes com traumas simples foram necessárias 9,2 visitas e 3,2 horas, e por traumas complicados 16,4 visitas e 8,5 horas por pessoa (68). O tipo mais prevalente de lesão foi fratura da coroa sem exposição pulpar (51%), seguido por fraturas coronárias com exposição pulpar (33%), luxação lateral (4%), luxação extrusiva (4%), fraturas de raiz (3%), concussão e subluxação (3%), invasão (2%) e avulsão (1%) (69).

Devido à alta ocorrência, a baixa cobertura de tratamento, necessidade de tratamentos dispendiosos e acompanhamento em longo prazo, o traumatismo dentário é uma problema de saúde pública que exige medidas preventivas e desenvolvimento de um método simples, conservador de restaurar a estética e a função dos dentes traumatizados.

Impacto da saúde bucal e do Traumatismo dentário na qualidade de vida

Traumatismo dentário pode ser considerado um problema de saúde pública não somente pelo aumento da ocorrência, mas também pelo potencial impacto na qualidade de vida dos indivíduos afetados (9). O alto custo do tratamento e a ocorrência maior em jovens sugerem que este problema continue para o resto da vida do paciente (3). Essas injúrias podem causar dor, estética deficiente, desordens funcionais e/ou psicológicas (56).

Medidas de qualidade de vida relacionadas à saúde oral podem trazer informações essenciais para tomada de decisões em procedimentos clínicos e também quando se avalia intervenções, serviços e programas de saúde oral (70). Recentes estudos investigaram a influência do tratamento de traumatismo dentário na qualidade de vida de crianças e adolescentes (56, 71-75). Entretanto, pouca evidência tem sido produzida nesse campo. O uso de casos-controle como delineamento das pesquisas e de instrumentos não específicos para medir qualidade de vida na faixa etária de crianças e adolescentes, são questões a serem levadas em conta na interpretação dos resultados desses estudos (56, 71, 72, 74). Além disso, os estudos de base populacional disponíveis na literatura (73, 75) não avaliam a necessidade de tratamento. A maioria dos estudos não discrimina trauma leve (fratura de esmalte) e trauma grave, sem considerar que os primeiros comumente não necessitam de nenhum tipo de tratamento. A inclusão de fraturas em esmalte no grupo de “traumatismo não tratado” sem avaliar a necessidade de

tratamento pode produzir uma interpretação equivocada a respeito do impacto do traumatismo dentário na qualidade de vida. Um dente anterior fraturado pode ter algum impacto na qualidade de vida da população infantil, uma vez que pode causar incapacidade funcional e alterar o relacionamento social devido à estética. Em Belo Horizonte - MG, Brasil, crianças com dentes fraturados não tratados demonstraram 20 vezes mais chance de sofrerem impacto em sua qualidade de vida, se comparadas com crianças sem dentes com trauma. Crianças com dentes fraturados relataram um impacto negativo na alimentação, na higiene, ao sorrir, no seu bem estar emocional e social (28). Em um estudo no Canadá, crianças que sofreram traumatismo dentário e que receberam tratamento para este agravo tiveram maior impacto no seu bem-estar social, porém este tratamento melhorou a estética e interações sociais, mas as deficiências funcionais persistiram, devido a presença de dor periodontal ou pulpar (56).

São necessários estudos que avaliem o impacto do traumatismo dentário na qualidade de vida, após a avaliação da necessidade de tratamento.

OBJETIVO GERAL

Estudar o traumatismo dentário na dentição permanente em escolares de 12 anos de Porto Alegre, Rio Grande do Sul, Brasil.

OBJETIVOS ESPECÍFICOS

- Estimar a prevalência e severidade de traumatismos dentários em dentes anteriores permanentes de escolares de 12 anos de Porto Alegre, RS, Brasil (ARTIGO I);

- Avaliar possíveis associações entre traumatismo dentário *versus* variáveis físicas e sócio-demográficas de escolares de 12 anos de Porto Alegre, RS, Brasil (ARTIGO I);

- Investigar o impacto do traumatismo dentário na auto-percepção e qualidade de vida em escolares de 12 anos de Porto Alegre, RS, Brasil, após avaliação da necessidade de tratamento (ARTIGO II).

**Traumatic dental injury among 12-year-old South Brazilian
schoolchildren: Prevalence, severity and risk indicators**

**Traumatic Dental Injury among 12-year-old South Brazilian schoolchildren:
Prevalence, severity and risk indicators**

Authors

Nailê Damé-Teixeira*

Luana Severo Alves*

Cristiano Susin**

Marisa Maltz*

Affiliation

* Department of Social and Preventive Dentistry, Faculty of Dentistry, Federal University of Rio Grande do Sul, Porto Alegre, Brazil; ** Department of Periodontics and Oral Biology, Medical College of Georgia School of Dentistry, Augusta, USA

Corresponding author

Marisa Maltz

Faculty of Dentistry - UFRGS

Department of Social and Preventive Dentistry

Ramiro Barcelos, 2492

Porto Alegre - RS - Brazil CEP: 90035-003

E-mail: marisa.maltz@gmail.com

Running title

Traumatic Dental Injury among Brazilian schoolchildren

Keywords

Dental injury, trauma, prevalence, social class, risk factors, epidemiology

Abstract

An increasing prevalence of traumatic dental injury (TDI) has been reported in the last few decades. The aim of this study was to assess the prevalence and severity of TDI and its association with socio-demographics and physical characteristics in the anterior permanent teeth of 12-year-old Brazilian schoolchildren. A cross-sectional study was carried out in a population-based sample of 1,528 subjects attending 33 public and 9 private schools (response rate of 83.17%). A single calibrated examiner performed the clinical examinations at the schools and recorded the TDI index (based on the Children's Dental Health Survey criteria), overjet and lip coverage. Height and weight were measured to calculate the body mass index (BMI). Parents/legal guardians answered a questionnaire containing socio-demographic questions. The relationships among TDI, socio-demographic variables and physical characteristics were assessed by survey Poisson regression models. The prevalence of TDI was 34.79% (mild trauma=24.37%; severe trauma=10.43%). Male schoolchildren (RR=1.41, $p=0.002$), and schoolchildren from low socioeconomic status (RR=1.32, $p=0.021$) were more likely to present at least one tooth with TDI, whereas students attending 7th grade (advanced students) were less likely to experience TDI (RR=0.59, $p=0.012$). Regarding the severity analysis, students of mid-high (RR=1.46, $p=0.022$), mid-low (RR=1.68, $p=0.045$) and low (RR=1.78, $p=0.027$) socioeconomic status were more likely to have mild trauma when compared to schoolchildren of high socioeconomic status. No significant association between severe trauma and socioeconomic status was observed. In conclusion, this study showed a high prevalence of TDI in 12-year-old Brazilian schoolchildren. Socio-demographic data and school achievement were associated with TDI.

Introduction

Traumatic dental injury (TDI) in children and adolescents has been extensively studied over the last few decades, with recent studies reporting prevalence rates ranging from 6% to 25% in different populations (1-6). In Brazil, the prevalence varies widely, ranging from 10% to 58% (7-10). The possible explanations for this variation include differences in places/environments, diagnostic criteria and methods of examination.

Several risk factors/indicators for TDI have been studied; however, few are well established in the literature. Studies have consistently shown that male individuals have a higher chance of TDI than female individuals (5, 8, 9). Other demographic characteristics, such as race, have been little investigated and only one publication could be found in the literature, and this study did not find an association (3). Socioeconomic status has been associated with several oral diseases and conditions, such as dental caries (11), periodontal diseases (12), tooth loss (13) and oral cancer (14). Nevertheless, the association between TDI and socioeconomic indicators remains unclear (8, 9, 15-18). Although some researchers have reported that schoolchildren with lower socioeconomic status are more likely to suffer TDI (10, 19-21), others have shown an inverse correlation, with wealthier children having a higher risk of TDI (7, 8). A recent review concluded that there are few studies correlating TDI in permanent teeth with socioeconomic indicators and that the majority found no such association (15).

Among physical factors, increased overjet has been consistently associated with TDI (22), whereas inadequate lip coverage has not been consistently associated with

TDI (7, 23). The childhood obesity epidemic has received increased attention worldwide, and some studies have assessed the relationship between obesity and TDI with inconsistent results (9, 24).

The aims of this study were to assess the prevalence and severity of TDI in the anterior permanent teeth of 12-year-old Brazilian schoolchildren and to assess the associations among TDI, socio-demographic data and physical characteristics.

Subjects and Methods

Study design

This study used a cross-sectional design and was carried out in Porto Alegre, southern Brazil, from September 2009 to December 2010. The target population was schoolchildren aged 12 years old who were attending public and private schools.

Sample size calculation

Sample size was calculated based on TDI prevalence estimates for a similar schoolchildren population in Southern Brazil (8). A sample size of 1,331 was calculated to be necessary to estimate a prevalence of 60% with a precision level of $\pm 3\%$ for the 95% confidence interval. A design effect of 30% and a non-response error of 40% were added to the sample size, and a final sample size of 1,837 was estimated.

Sampling strategy and sample characteristics

A multistage probability sampling strategy was used. The primary sampling unit consisted of five geographical areas organized according to the municipal water fluoridation system. Within each area, the schools were randomly selected proportional to the number of private and public schools (42 schools: 33 public and 9

private). Schoolchildren born in 1997 or 1998 were then randomly selected proportional to the number of schoolchildren in each school. A total of 1,528 schoolchildren were examined, yielding a response rate of 83.17%.

Data collection

A questionnaire containing questions on demographic and socioeconomic characteristics was sent to parents/legal guardians of each selected student. The questionnaire gathered information on demographic and socioeconomic characteristics, such as gender, skin color, mother's and father's education, socioeconomic status (using the standard Brazilian economic classifications) (25), and numbers of rooms and people living in the house. Information on the school year that the student was attending was recorded. Information regarding location, cause and age of TDI was gathered using specific questions.

Clinical examination was performed at the schools with the students in a supine position, using artificial light, a clinical mirror, a periodontal probe (Williams no. 23, Golgran, São Paulo, Brazil) and gauze. The instruments were properly packed and sterilized. TDI was recorded according to the Children's Dental Health Survey criteria (26): (0) no trauma; (1) enamel fracture alone; (2) enamel-dentine fracture; (3) fracture with pulp exposure; (4) sign of pulp involvement, but without sign of fracture; (5) missing tooth due to TDI; and (6) other types of TDI. Overjet was measured as the distance, in millimeters, between the buccal surface of the more prominent upper central incisor and the corresponding lower incisor, with the millimetric probe positioned parallel to the occlusal plane. Overjet was a negative value in patients with anterior crossbites and 0 in cases of top bite. Lip coverage was visually assessed and scored as adequate (lips form an anterior seal when the mandible is in a

physiological rest position) or inadequate (lips do not form an anterior seal under the same condition, and the incisors remain apparent) (27).

Anthropometric data were gathered to allow the calculation of body mass index (BMI). Participants were weighed using a digital scale, and two readings were made. A third assessment was taken if a difference >0.3 kg was observed between measurements (24). The mean of the two closest measurements was used to calculate BMI. The schoolchildren wore light clothing and no shoes. Height was measured to the nearest full centimeter using inelastic metric tape attached to a flat wall with no footer (28).

Measurement reproducibility

A single calibrated examiner (NDT) performed all measurements. Before the beginning of the study, calibration of the TDI index was performed by the repeated assessment of 30 photographs. During the survey, repeated examinations were conducted on 5% of the sample. The minimal time interval between examinations was two days. The median Cohen's kappa value was 0.80 (range 0.72 to 0.88).

Ethical considerations

This study was approved by the Federal University of Rio Grande do Sul Research Ethics Committee (299/08) and by the Municipal Health Department of Porto Alegre Research Ethics Committee (process no. 001.049155.08.3/register no. 288). A written letter explaining the study aims and procedures and inviting families to participate was sent in advance to the selected schoolchildren's households. All participants and their parents/legal guardians signed free informed consent.

Non-response analysis

Of the 337 and 1,500 schoolchildren who were selected from private and public schools, 76 and 233 did not participate, yielding response rates of 77.44% and

84.46%, respectively. Telephone contact was established with 176 parents/legal guardians of the non-respondents. Of those children, 26% reported no interest due to previous access to dental care, 27% of schoolchildren refused to participate, 24% did not return the informed consent or questionnaire, and 4% showed concern about biosecurity or refused to answer socioeconomic questions. Nineteen percent of students were not available at school during the normal survey schedule.

A random sample of non-respondents was selected, and demographic and socioeconomic data were obtained for 80 schoolchildren. Among those students, 44% were girls, and 56% were boys; 77% were white, and 23% were non-white; 21% had high socioeconomic status, 31% had mid-high status, 46% had mid-low status, and 2% had low socioeconomic status. Regarding parents' educations, 42% had only attended elementary school, 41% had attended high school and 17% had attended a university. Given the discrepancies in some of the demographic and socioeconomic features between the study participants and non-respondents, a weighted variable based on information provided by the Primary Education School Census of 2010 (29) was used in the statistical analysis to minimize the non-responses.

Data analysis

Prevalence was defined as the percentage of schoolchildren having any TDI score. TDI severity was categorized into no trauma (all teeth having scores 0), mild trauma (≥ 1 tooth with a scores 1) or severe trauma (≥ 1 tooth with scores 2, 3, 4, 5, or 6).

Socioeconomic status used cutoff points proposed by the standard Brazilian economic classification, and households were classified into low (≤ 13 points), mid-low (≥ 14 to ≤ 22 points), mid-high (≥ 23 to ≤ 28 points) and high (≥ 29 points) status, following the data distribution. Student school year was categorized into regular (5th and 6th grades), late (4th grade or earlier) and advanced (7th grade). Household

crowding was calculated as the number of persons per room, and it was categorized into low (≤ 0.6 persons/room), medium (> 0.6 to ≤ 1 persons/room) and high crowding (> 1 person/room). BMI was calculated using the standard formula and was categorized according to gender-specific cutoff points for this age group (28).

Data analysis was performed using STATA software (Stata 11.1 for Mac; Stata Corporation, College Station, TX, USA) and survey commands that took into account the survey design, including clustering, weighting and robust variance estimations. A weight variable was therefore used to adjust for the potential bias in the population estimates (30). The sample weight was adjusted for the probability of selection and population distribution according to gender, school type and city area. Probability of selection was calculated by dividing the population size by the number of individuals sampled in each area. This procedure also permitted the achievement of the expansion weight. The distribution of the population (poststratification) was calculated using the Primary Education School Census (29). The sample and the population were divided into various subgroups according to gender, school type and city area. The final sample weighted variable was calculated by multiplying the base weight by the poststratification adjustment. Pairwise comparisons for demographic, socioeconomic and physical factors were carried out using the Wald test. The chosen level of statistical significance was 5%.

The association of TDI prevalence and severity with the independent variables was assessed using survey Poisson regression models. The preliminary analysis was carried out using a univariable model, and variables showing associations with $p < 0.25$ were selected for the multivariable analysis. Confounding and effect modifications were assessed. Variables were considered confounders if a change of 30% or more in other variables in the model was observed. Effect modification was

assessed by including interaction terms in the multivariable models. No statistically significant interactions were observed. The contribution of each variable to the model was assessed by means of the Wald statistic. Since no association between TDI and schoolchildren late at school was observed in the multivariable model ($p=0.20$), the variable school year was dichotomized into regular/late and advanced.

Results

Table 1 shows the prevalence and severity of TDI by demographic, socioeconomic and physical characteristics. The overall prevalence of TDI was 34.79%. Considering the severity of TDI, 24.37% of individuals had mild trauma (enamel fracture alone), and 10.43% had severe trauma, including cases of enamel-dentine fracture without pulp involvement (9.43%), enamel-dentine fracture with pulp involvement (0.52%), tooth loss (0.11%) and other types of trauma, such as trauma in periodontal tissue (0.37%). The majority of affected individuals had one (62.95%) or two teeth (27.68%) with TDI. Upper incisors were the most affected teeth, whereas canines were the least affected. The average number of traumatized teeth was 0.52 (standard error=0.02).

The majority of individuals who had suffered TDI did not remember the cause (53.64%), location (53.66%) or age (61.67%) of the incident. The most common cause of injury was falls (15.46%), followed by sports (11.08%), collision against objects or people (10.60%), violence and traffic accidents (0.70% and 0.54%, respectively), and other causes 7.98%. TDI occurred at home in 22.32% of cases, at school in 8.52% of cases and elsewhere in 15.50% of cases. Regarding age, there

was an even distribution of episodes of TDI in all ages (6 to 12 years old), with a slight predominance in ages 10 and 11 years old.

In the univariable analysis, several factors were significantly associated with the occurrence of TDI, including gender, socioeconomic status, parents' educations, school year and household crowding. After adjusting for the other factors in the multivariable analysis, male individuals (RR=1.41, p=0.002), and schoolchildren with low socioeconomic status (RR=1.32, p=0.021) were more likely to present at least one tooth with TDI. In contrast, students attending 7th grade (advanced students) were less likely (RR=0.59, p=0.012) to have TDI than students in the 6th grade or below (Table 2).

The effect of socioeconomic status on TDI severity is shown in table 3. Mild TDI was significantly associated with lower socioeconomic status. After adjusting for gender, and school year, students of low socioeconomic status were 78% more likely to have mild TDI than those of high socioeconomic status. In contrast, no statistically significant associations were observed between severe TDI and socioeconomic status.

Discussion

This study was carried out to assess the prevalence, severity, and risk indicators of TDI in the anterior permanent teeth of 12-year-old South Brazilian schoolchildren. We found a high prevalence of mild trauma, whereas severe trauma was infrequent. The presence of TDI was significantly associated with gender, socioeconomic status and school year. Mild trauma was associated with socioeconomic status in a direct

manner. In contrast, no statistically significant associations were observed between severe TDI and socioeconomic status.

The prevalence of TDI in this population was approximately 35%, which is higher than in the US/Europe/Africa but similar/lower than elsewhere (1-6). The heterogeneity of the prevalence rates might be explained, at least in part, by differences in diagnostic criteria and methods of examination (10, 15, 23, 31). In the present study, the fact that students were in a supine position, the use of artificial light, and tooth drying may have increased the sensitivity of the examination. It is also important to acknowledge that other population and societal factors may have had an impact on the epidemiology of TDI.

Several studies have shown significant differences in the occurrence of TDI between genders, and a higher prevalence in boys has been consistently found (5, 8, 9, 32). The present survey is in agreement with these studies, with boys having a 41% higher likelihood of TDI than girls. Adjustment for other factors (socioeconomic status and school year) in the multivariable model did not affect the magnitude of this association, strengthening the role of gender in the occurrence of TDI. Boys frequently engage in contact sports and intense/competitive activities, which increase the risk for accidents (5, 33-35).

Several variables have been used as proxies to try to capture the effect of children and adolescents' socioeconomic status on TDI, including school type (public or private) (10, 19, 23, 36), parents' educations (9, 17), income (8, 9, 19), socioeconomic status (6, 37) and housing conditions (21). We have used a comprehensive set of variables to assess this relationship, and all variables showed significant or borderline significant associations with TDI in the univariable analyses. Schoolchildren with mid-low and low socioeconomic status who were living in

situations of high household crowding were more likely to suffer TDI, whereas those individuals with parents having higher educations were less likely to experience TDI. School type was borderline significantly associated with TDI, with public school students having a greater chance of having TDI. After adjustment for gender and school year, schoolchildren with mid-low and low socioeconomic status were around 50% more likely to suffer TDI than schoolchildren with high socioeconomic status. This finding may be explained by the lifestyle of this population, which is more likely to live in unsafe environments (15) and is less socially secure (19). Regarding severity analysis, there was a tendency of students from higher socioeconomic status toward having severe TDI. In the multivariable analysis, mild TDI was significantly associated with mid-high (RR=1.46, p=0.022), mid-low (RR=1.68, p=0.045) and low (RR=1.78, p=0.027) socioeconomic status, whereas severe TDI was not significantly correlated to socioeconomic status. Some studies have shown no association between TDI and socioeconomic status (2, 5, 32, 39). Among those that found such associations, the majority observed a higher prevalence of TDI in individuals with lower socioeconomic status (10, 19-21, 40), as was found in the present study. It has been suggested that developing countries present an inverse association (more TDI in individuals with higher socioeconomic status) (8, 15). However, this study does not support this hypothesis, nor do other surveys conducted in developing countries (10, 40).

In this study, we found an inverse correlation between TDI and students who were ahead of their class. Students in 7th grade were 41% less likely to have TDI than students in the 6th grade or below. This association remained significant after adjusting for gender and socioeconomic status, indicating an independent effect on TDI. The rationale for this protective effect is unclear; nevertheless, it is likely to be

related to the behavioral characteristics of these students. No association between TDI and being late at school (4th grade or earlier) was observed in this study.

Conflicting results have been observed with regard to the role of physical characteristics on TDI occurrence. A tendency toward a higher chance of TDI was observed in students with inadequate lip coverage; however, this association never reached statistical significance. This finding is in contrast to several reports that showed a protective effect of adequate lip coverage on TDI (8, 21, 24, 41). Similarly, most studies have shown an increased risk of TDI in children with increased overjets. A meta-analysis assessing 11 articles found a significant relationship between an overjet >3mm and TDI (22). In the present study, no significant association was observed between TDI and overjet. Recently, the association between obesity and TDI has gained greater attention due to the increase in childhood obesity. In the present study, no significant association was found between BMI and TDI, and this finding is in agreement with another study carried out in Brazil. In contrast, two earlier studies showed that overweight students were more affected by TDI (9, 24).

In conclusion, the present study showed a high prevalence of TDI in 12-year-old Brazilian schoolchildren. Gender, socioeconomic status and school achievement were associated with TDI.

References

1. Altun C, Ozen B, Esenlik E, Guven G, Gurbuz T, Acikel C, et al. Traumatic injuries to permanent teeth in Turkish children, Ankara. *Dent Traumatol* 2009;25: 309-13.

2. David J, Astrom AN, Wang NJ. Factors associated with traumatic dental injuries among 12-year-old schoolchildren in South India. *Dent Traumatol* 2009;25: 500-5.
3. Kaste LM, Gift HC, Bhat M, Swango PA. Prevalence of incisor trauma in persons 6-50 years of age: United States, 1988-1991. *J Dent Res* 1996;75 Spec No: 696-705.
4. Navabazam A, Farahani SS. Prevalence of traumatic injuries to maxillary permanent teeth in 9- to 14-year-old school children in Yazd, Iran. *Dent Traumatol* 2010;26: 154-7.
5. Naidoo S, Sheiham A, Tsakos G. Traumatic dental injuries of permanent incisors in 11- to 13-year-old South African schoolchildren. *Dental Traumatol* 2009;25: 224-28.
6. Locker D. Prevalence of traumatic dental injury in grade 8 children in six Ontario communities. *Can J Public Health* 2005;96: 73-6.
7. Cortes MI, Marcenes W, Sheiham A. Prevalence and correlates of traumatic injuries to the permanent teeth of schoolchildren aged 9-14 years in Belo Horizonte, Brazil. *Dent Traumatol* 2001;17: 22-6.
8. Marcenes W, Zabet NE, Traebert J. Socio-economic correlates of traumatic injuries to the permanent incisors in schoolchildren aged 12 years in Blumenau, Brazil. *Dent Traumatol* 2001;17: 222-6.
9. Nicolau B, Marcenes W, Sheiham A. Prevalence, causes and correlates of traumatic dental injuries among 13-year-olds in Brazil. *Dent Traumatol* 2001;17: 213-7.

10. Soriano EP, Caldas-Jr AF, Carvalho MVD, Amorim-Filho HA. Prevalence and risk factors related to traumatic dental injuries in Brazilian schoolchildren. *Dent Traumatol* 2007;23: 232-40.
11. Maltz M, Barbachan e Silva B. [Relationship among caries, gingivitis and fluorosis and socioeconomic status of schoolchildren]. *Rev Saude Publica* 2001;35: 170-6.
12. Susin C, Haas AN, Valle PM, Oppermann RV, Albandar JM. Prevalence and risk indicators for chronic periodontitis in adolescents and young adults in South Brazil. *J Clin Periodontol* 2011;38: 326-33.
13. Susin C, Haas AN, Opermann RV, Albandar JM. Tooth loss in a young population from South Brazil. *J Public Health Dent* 2006;66: 110-5.
14. Warnakulasuriya S. Significant oral cancer risk associated with low socioeconomic status. *Evid Based Dent* 2009;10: 4-5.
15. Bendo CB, Scarpelli AC, Vale MP, Araújo Zarzar PM. Correlation between socioeconomic indicators and traumatic dental injuries: A qualitative critical literature review. *Dent Traumatol* 2009;25: 420-5.
16. Glendor U. Aetiology and risk factors related to traumatic dental injuries - a review of the literature. *Dent Traumatol* 2009;25: 19-31.
17. Fakhruddin KS, Lawrence HP, Kenny DJ, Locker D. Impact of treated and untreated dental injuries on the quality of life of Ontario schoolchildren. *Dent Traumatol* 2008;24: 309-13.
18. Sgan-Cohen HD, Megnagi G, Jacobi Y. Dental trauma and its association with anatomic, behavioral, and social variables among fifth and sixth grade schoolchildren in Jerusalem. *Community Dent Oral Epidemiol* 2005;33: 174-80.

19. Artun J, Al-Azemi R. Social and behavioral risk factors for maxillary incisor trauma in an adolescent Arab population. *Dent Traumatol* 2009;25: 589-93.
20. Malikaew P, Watt RG, Sheiham A. Associations between school environments and childhood traumatic dental injuries. *Oral Health Prev Dent* 2003;1: 255-66.
21. Marcenes W, Murray S. Social deprivation and traumatic dental injuries among 14-year-old schoolchildren in Newham, London. *Dental Traumatol* 2001;17: 17-21.
22. Nguyen QV, Bezemer PD, Habets L, Prah-Andersen B. A systematic review of the relationship between overjet size and traumatic dental injuries. *Eur J Orthod* 1999;21: 503-15.
23. Soriano EP, Caldas-Jr AF, Goes PSA. Risk factors related to traumatic dental injuries in Brazilian schoolchildren. *Dental Traumatol* 2004;20: 246-50.
24. Petti S, Cairella G, Tarsitani G. Childhood obesity: A risk factor for traumatic injuries to anterior teeth. *Endod Dent Traumatol* 1997;13: 285-8.
25. ABEP. Standard Brazilian economic classifications. Brazil, 2009. In: <http://www.abep.org/novo/CMS/Utils/FileGenerate.ashx?id=12>.
26. O'brien M. *Children's dental health in the united kingdom 1993. Report of dental survey, office of population censuses and surveys*. London: Her Majesty's Stationary Office; 1994.
27. Jackson D. Lip positions and incisor relationships. *British Dent J* 1962;112: 147-58.
28. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: International survey. *British Med J* 2000;320: 1240-3.
29. Brazil. Primary education school census: *Educacenso* In: MEC/INEP, 2010.
30. Korn B, Graubard E. *Analysis of health surveys*. New York; 1999.

31. Glendor U. Epidemiology of traumatic dental injuries - a 12 year review of the literature. *Dent Traumatol* 2008;24: 603-11.
32. Nicolau B, Marcenes W, Sheiham A. The relationship between traumatic dental injuries and adolescents' development along the life course. *Community Dent Oral Epidemiol* 2003;31: 306-13.
33. Marcenes W, al Beiruti N, Tayfour D, Issa S. Epidemiology of traumatic injuries to the permanent incisors of 9-12-year-old schoolchildren in Damascus, Syria. *Endod Dent Traumatol* 1999;15: 117-23.
34. Marcenes W, Alessi ON, Traebert J. Causes and prevalence of traumatic injuries to the permanent incisors of schoolchildren aged 12 years in Jaragua do Sul, Brazil. *Int Dent J* 2000;50: 87-92.
35. Kahabuka FK, Mugonzibwa EA. Risk factors for injuries to maxillary permanent incisors and upper lip among schoolchildren in Dar es Salaam, Tanzania. *Int J Paediatr Dent* 2009;19: 148-54.
36. Sgan-Cohen HD, Megnagi G, Jacobi Y. Dental trauma and its association with anatomic, behavioral, and social variables among fifth and sixth grade schoolchildren in Jerusalem. *Community Dent Oral Epidemiol* 2005;33: 174–80.
37. Jamani KD, Fayyad MA. Prevalence of traumatized permanent incisors in Jordanian children, according to age, sex and socio-economic class. *Odontostomatol Trop* 1991;14: 17-20.
38. Feldens CA, Kramer PF, Vidal SG, Faraco Junior IM, Vítolo MR. Traumatic dental injuries in the first year of life and associated factors in Brazilian infants. *J Dent Child (Chic)* 2008;75: 7-13.

39. Fakhruddin SK, Lawrence HP, Kenny DJ, Locker D. Etiology and environment of dental injuries in 12- to 14-year-old Ontario schoolchildren. *Dental Traumatol* 2008;24: 305–08.
40. Ramos-Jorge ML, Peres MA, Traebert J, Ghisi CZ, Paiva SM, Pordeus IA, et al. Incidence of dental trauma among adolescents: A prospective cohort study. *Dental Traumatol* 2008;24: 159-63.
41. Traebert J, Bittencourt DD, Peres KG, Peres MA, Lacerda JT, Marcenes W. Aetiology and rates of treatment of traumatic dental injuries among 12-year-old school children in a town in Southern Brazil. *Dental Traumatol* 2006;22: 173-78.

Table 1. Frequency distribution, prevalence and severity of traumatic dental injury by demographic, socioeconomic, and physical characteristics in 12-year-old schoolchildren in Porto Alegre, Brazil

Variable	n (%)	Prevalence [†]		Severity [∞] %		
		% (SE)	p	Mild	Severe	p
<i>Gender</i>						
Female	758 (49.61)	28.61 (2.07)	ref.	20.54	8.07	
Male	770 (50.39)	40.79 (1.26)	0.000	28.08	12.72	0.001
<i>Skin color</i>						
White	1,065 (69.70)	32.92 (1.90)	ref.	23.32	9.61	
Non-white	463 (30.30)	39.41 (1.78)	0.054	26.95	12.47	0.069
<i>Skin color</i>						
White	1,065 (69.70)	32.92 (1.90)	ref.	23.32	9.61	
<i>Social class</i>						
High	141 (9.23)	26.48 (2.16)	ref.	14.06	12.42	
Mid-high	358 (23.43)	33.17 (2.95)	0.089	21.90	11.27	
Mid-low	871 (57.00)	36.79 (0.01)	0.025	26.66	10.13	
Low	158 (10.34)	37.44 (0.01)	0.007	29.88	7.57	0.109
<i>Mother's education*</i>						
Elementary school	789 (51.87)	38.14 (2.00)	ref.	27.82	10.32	
High school	516 (33.93)	32.59 (2.83)	0.232	22.70	9.90	
University	216 (14.20)	29.60 (1.52)	0.039	17.46	12.15	0.193
<i>Father's education*</i>						
Elementary school	788 (55.22)	37.90 (1.41)	ref.	27.09	10.82	
High school	436 (30.55)	31.21 (1.63)	0.015	22.25	8.97	
University	203 (14.23)	29.86 (2.00)	0.010	17.52	12.35	0.021
<i>School</i>						
Private	261 (17.08)	31.60 (0.92)	ref.	18.56	13.05	
Public	1,267 (82.92)	35.69 (1.77)	0.082	26.01	9.69	0.084
<i>School year</i>						
Regular (6 th or earlier)	1,480 (96.86)	35.40 (1.58)	ref.	25.05	10.35	
Advanced (7 th)	48 (3.14)	18.42 (1.71)	0.000	5.92	12.50	0.135
<i>Crowding</i>						
Low	351 (22.97)	29.68 (2.43)	ref.	19.40	10.29	
Medium	827 (54.12)	34.75 (1.31)	0.061	24.17	10.58	
High	350 (22.91)	41.14 (2.26)	0.024	30.90	10.25	0.088
<i>Overjet*</i>						
0-5 mm	1,320 (86.90)	33.71 (1.64)	ref.	24.12	9.59	
6+ mm	199 (13.10)	40.84 (5.48)	0.284	26.53	14.31	0.267
<i>Lip coverage</i>						
Adequate	1,004 (65.71)	32.86 (1.93)	ref.	23.63	9.24	
Inadequate	524 (34.29)	38.60 (2.59)	0.147	25.82	12.78	0.305
<i>BMI</i>						
Underweight	12 (0.79)	37.42 (11.17)	0.868	37.42	0.00	
Normal	1,114 (72.91)	35.54 (1.74)	ref.	23.92	11.63	
Overweight	268 (17.54)	33.18 (2.96)	0.734	24.75	8.44	
Obese	134 (8.77)	31.64 (3.62)	0.594	26.02	5.62	0.248
TOTAL	1,528 (100.00)	34.95 (1.22)		24.37	10.43	

*Missing data; † Wald test; ∞ Chi-square test; BMI = Body Mass Index; ref.= reference category; SE = standard error

Table 2. Prevalence of traumatic dental injury by demographic, socioeconomic, and physical characteristics in 12-year-old schoolchildren in Porto Alegre, Brazil (Poisson regression)

Variable	Univariable			Multivariable		
	RR	95% CI	p	RR	95%CI	P
<i>Gender</i>						
Female	1.00			1.00		
Male	1.42	1.24-1.63	0.002	1.41	1.23-1.61	0.002
<i>Skin color</i>						
White	1.00					
Non-white	1.19	0.99-1.44	0.057			
<i>Socioeconomic status</i>						
High	1.00			1.00		
Mid-high	1.25	0.95-1.64	0.083	1.21	0.90-1.62	0.142
Mid-low	1.38	1.04-1.83	0.031	1.31	0.99-1.74	0.051
Low	1.41	1.14-1.74	0.010	1.32	1.07-1.64	0.021
<i>Mother's education</i>						
Elementary school	1.00					
High school	0.85	0.62-1.17	0.242			
University	0.77	0.61-0.97	0.038			
<i>Father's education</i>						
Elementary school	1.00					
High school	0.82	0.71-0.94	0.017			
University	0.78	0.67-0.92	0.015			
<i>School</i>						
Private	1.00					
Public	1.12	0.98-1.29	0.074			
<i>School year</i>						
Regular/late (6 th or below)	1.00			1.00		
Advanced (7 th grade)	0.52	0.40-0.66	0.002	0.59	0.43-0.82	0.012
<i>Crowding</i>						
Low	1.00					
Medium	1.17	0.97-1.40	0.078			
High	1.38	1.05-1.81	0.028			
<i>Overjet</i>						
0-5 mm	1.00					
6+ mm	1.21	0.81-1.80	0.254			
<i>Lip coverage</i>						
Adequate	1.00					
Inadequate	1.17	0.91-1.50	0.142			
<i>BMI</i>						
Underweight	1.05	0.48-2.30	0.865			
Normal	1.00					
Overweight	0.93	0.71-1.21	0.509			
Obese	0.89	0.62-1.26	0.412			

BMI = body mass index; RR = rate ratio; CI = confidence interval

Table 3. Effect of socioeconomic status on severity of traumatic dental injury in 12-year-old schoolchildren in Porto Alegre, Brazil (Poisson regression)

	Univariable						Multivariable [†]					
	Mild			Severe			Mild			Severe		
	RR	95% CI	p	RR	95%CI	p	RR	95% CI	p	RR	95%CI	p
<i>Socioeconomic status</i>												
High	1.00			1.00			1.00			1.00		
Mid-high	1.53	1.20-1.95	0.008	0.99	0.54-1.81	0.994	1.46	1.09-1.94	0.022	0.94	0.52-1.71	0.814
Mid-low	1.84	1.05-3.25	0.039	0.95	0.52-1.74	0.844	1.68	1.01-2.77	0.045	0.85	0.47-1.53	0.504
Low	2.01	1.22-3.29	0.017	0.74	0.35-1.58	0.342	1.78	1.11-2.85	0.027	0.64	0.33-1.22	0.132

Estimates are adjusted for gender and school year; RR = rate ratio; CI = confidence interval

**Traumatic dental injuries with treatment needs negatively impact quality
of life of Brazilian schoolchildren**

**Traumatic dental injury with treatment needs negatively affects the quality
of life of Brazilian schoolchildren**

Authors

Nailê Damé-Teixeira*

Luana Severo Alves*

Thiago Machado Ardenghi**

Cristiano Susin***

Marisa Maltz*

Affiliation

* Department of Social and Preventive Dentistry, Faculty of Dentistry, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil; ** Department of Stomatology, Federal University of Santa Maria, Santa Maria, RS, Brazil; ***Department of Periodontics and Oral Biology, Georgia Health Sciences University College of Dental Medicine, Augusta, USA.

Corresponding author

Marisa Maltz

Faculty of Dentistry - UFRGS

Department of Social and Preventive Dentistry

Ramiro Barcelos, 2492

Porto Alegre - RS - Brazil CEP: 90035-003

E-mail: marisa.maltz@gmail.com

Running title

Impact of traumatic dental injuries on quality of life

Keywords

Dental trauma, tooth injuries, quality of life, epidemiology

Abstract

Objectives: The aim of this study was to investigate the impact of traumatic dental injury (TDI) with treatment needs on the oral health-related quality of life (OHRQoL) of South Brazilian schoolchildren. *Methods:* A cross-sectional study was performed in Porto Alegre, Brazil, using a multistage probability sampling strategy. Of 1,837 eligible 12-year-old schoolchildren attending public and private schools, 1,528 were examined. OHRQoL was assessed by the Brazilian version of the Child Perceptions Questionnaire for 11–14-year-old children (CPQ₁₁₋₁₄) – 16-item short form. Clinical examination was conducted to assess the presence of TDI in permanent incisors (Children’s Dental Health Survey criteria), malocclusion, and dental caries. Parents/legal guardians answered questions on socioeconomic status. Statistical analyses were performed using Poisson regression models. *Results:* The overall CPQ₁₁₋₁₄ score was not associated with TDI. In the functional limitations domain, individuals presenting TDIs with treatment needs experienced significantly higher mean CPQ₁₁₋₁₄ than individuals with no TDI or without treatment needs (RR = 1.21; 95% CI = 1.05–1.39), after adjusting for malocclusion, dental caries, gender, and socioeconomic status. No other domains were associated with TDI. *Conclusions:* The present study revealed that TDI with treatment needs negatively affects the OHRQoL in this population of 12-year-old schoolchildren and that this impact is related to oral functions.

Introduction

Traumatic dental injury (TDI) has been considered a significant problem in youth. Epidemiological data indicate that the incidence of TDI will continue to increase steadily in young and middle-aged individuals (1). TDI is a public health concern not only because of its consequences to the craniofacial structures but also for its potential impact on the quality of life of affected individuals (2). These injuries may cause pain, functional impairment, poor aesthetics, and psychosocial problems (3). In this regard, assessment of oral health-related quality of life (OHRQoL) is essential to understand the true repercussions of TDI and more importantly to allow better management of TDI at the individual and population levels (4).

Recent studies have investigated the influence of treated and untreated TDI on the quality of life of children and adolescents (2, 3, 5-8). However, methodological shortcomings may have hindered data collection and analysis. OHRQoL instruments not specific for this age group may have affected the validity of the data (2, 3, 5, 7). Furthermore, the population-based studies available in the literature (6, 8) have failed to address the treatment needs of these injuries. Most studies combined mild and severe trauma, ignoring that enamel fracture usually does not require immediate treatment (9). The inclusion of enamel fractures in the “untreated TDI group” without the assessment of treatment needs may prevent the investigation of the impact of these TDIs on quality of life. Our hypothesis was that TDI with treatment needs would have a significant impact on the quality of life of schoolchildren, whereas TDIs that do not require dental care would have no detectable effect. The aim of this study

was to investigate the impact of TDI on the OHRQoL of 12-year-old South Brazilian schoolchildren after assessing treatment needs.

Subjects and Methods

Study design and sample

A survey was performed to assess the oral health status of 12-year-old schoolchildren attending public and private schools in the city of Porto Alegre, RS, Brazil. Porto Alegre is the capital of the most southern Brazilian state, with an estimated population of 1,409,939 habitants in 2010, including 20,807 12-year-old schoolchildren (10).

A multistage probability sampling strategy was used. The primary sampling unit consisted of 5 geographical areas organized according to the municipal water fluoridation system. Within each area, schools were randomly selected proportional to the number of existing private and public schools (42 schools: 33 public and 9 private). Schoolchildren born in 1997 or 1998 were randomly selected proportional to school size by using a table of random numbers.

Sample size was calculated on the basis of TDI prevalence estimates of a similar schoolchildren population in Southern Brazil (11). A sample size of 1,331 was calculated to be necessary to estimate a prevalence of 60% with a precision level of $\pm 3\%$ for the 95% confidence interval (CI) and assuming a design effect of 1.3. A non-response error of 40% was added, and the final sample size of 1,837 was estimated.

Data collection

Data collection was conducted from September 2009 to December 2010. The Child Perceptions Questionnaire for 11–14-year-old children (CPQ₁₁₋₁₄) – ISF: 16 questions (12) was answered for each schoolchild prior to clinical examination. This instrument is a generic measure of the functional and psychosocial impacts of oral disorders in children of that age (12-14) that has been validated (15) and cross-culturally adapted for the Brazilian Portuguese language (16). In this instrument, children are asked how often in the past 3 months have they experienced problems with their teeth, lips, jaws, and mouth described by 16 items classified into 4 domains: oral symptoms, functional limitations, emotional well-being, and social well-being. Each item has 5 answer alternatives: 0 = never; 1 = once/twice; 2 = sometimes; 3 = often; and 4 = every day/almost every day (6). Higher values denote a greater impact on quality of life.

Clinical examination was performed at the schools with the students in a supine position by using artificial light, a clinical mirror, a periodontal probe, and gauze. TDI in the 8 permanent incisor teeth was recorded according to the Children's Dental Health Survey criteria (17) as follows: 0 = no trauma; 1 = enamel fracture only; 2 = enamel–dentine fracture; 3 = enamel–dentine fracture with pulp exposure; 4 = signs of pulp involvement without signs of fracture; 5 = missing tooth due to TDI; or 6 = other TDI. The type of treatment was recorded as follows: 0 = untreated; 1 = treated with composite restoration; 2 = treated with endodontics and composite restoration; 3 = treated with a single crown; 4 = treated with a removable partial denture; or 5 = other treatment. Finally, treatment needs were assessed on the basis of the presence of

aesthetics/functional involvement or pain/sensibility as follows: 0 = no treatment need; 1 = needing composite restoration; 2 = needing endodontic treatment and composite restoration; 3 = needing endodontic treatment, composite restoration, and bleaching; 4 = needing a single crown; 5 = needing endodontic treatment and a single crown; 6 = needing a removable partial denture; or 7 = needing other treatment.

The presence or absence of malocclusion was recorded using the Dental Aesthetic Index (DAI), which assesses the social acceptability of teeth (18). After tooth cleaning and drying, the dental caries experience was recorded using the decayed – cavity level, missing, and filled teeth (DMFT) index. Socioeconomic status was assessed by means of a questionnaire directed to parents/legal guardians and was based on the standard Brazilian economic classification (19). This classification considers the educational level of the head of the family and the purchasing power of the family.

Measurement reproducibility

One examiner (NDT) performed the clinical examination regarding TDI and DAI, and another examiner (LSA) recorded the DMFT index data. Both examiners were trained for the used indexes. During the survey, intraexaminer reproducibility was assessed by repeating the clinical examination after 2 days or more in 5% of the sample. Cohen's Kappa value was 0.72 for TDI and 0.80 for DFMT, and the intraclass correlation coefficient for DAI measures was 0.91.

Ethical considerations

This study was approved by the Federal University of Rio Grande do Sul Research Ethics Committee (299/08) and by the Municipal Health Department of Porto Alegre Research Ethics Committee (process n^o 001.049155.08.3/register n^o 288). All participants and their parents/legal guardians provided written informed consent.

Data analysis

The primary outcome (dependent variable) of the study was OHRQoL as measured by the sum of CPQ₁₁₋₁₄ scores. The main predictor variable (independent variable) was TDI according to treatment needs, and schoolchildren were grouped as follows: (1) schoolchildren with no TDI or with TDI without treatment needs; (2) schoolchildren with treated TDI; and (3) schoolchildren with TDI with treatment needs. Schoolchildren with no TDI or TDI without treatment needs were used as the reference category in all analyses.

Data analysis was performed using STATA software (Stata 11.1 for Windows; Stata Corporation, College Station, TX, USA), taking into account the survey design. Given the discrepancy in some of the demographic and socioeconomic features among the study participants and subjects who did not participate, a weight variable was used in the statistical analysis to adjust for the potential bias in the population estimates (20). The sample weight was adjusted for the probability of selection and population distribution according to gender, school type, and city area. Probability of selection was calculated by dividing the population size by the number of individuals sampled in each area. This procedure also permitted achieving the expansion weight. The distribution of the

population (poststratification) was calculated using the Primary Education School Census (10). The sample and the population were divided into various subgroups according to gender, school type, and city area. The final sample weight variable was calculated by multiplying the base weight with the poststratification adjustment.

Domain-specific and overall CPQ₁₁₋₁₄ mean scores and 95% CIs were reported. Wald tests adjusted for multiple comparisons were used to compare CPQ₁₁₋₁₄ scores between TDI and treatment needs groups. The association between the main predictor variable (TDI) and the outcomes (domain-specific and overall CPQ₁₁₋₁₄ scores) was assessed using a survey Poisson regression model. Unadjusted and adjusted rate ratios (ratio of geometric means) and 95% CIs were estimated and reported. Adjusted estimates were controlled for malocclusion, dental caries, gender, and socioeconomic status. Malocclusion was dichotomized into absent (DAI \leq 25) or present (DAI $>$ 25). Dental caries was dichotomized into DFMT = 0 or DFMT \geq 1. Socioeconomic status used cutoff points proposed by the standard Brazilian economic classification, and households were categorized into low (\leq 13 points), mid-low (\geq 14 to \leq 22 points), mid-high (\geq 23 to \leq 28 points), and high (\geq 29 points) socioeconomic status, following the data distribution.

Results

A total of 1,528 schoolchildren was examined, representing a response rate of 83.17%. Table 1 summarizes the frequency distribution of samples by demographic, socioeconomic, and clinical characteristics.

Regarding TDI treatment conditions, 1,372 of 1,528 schoolchildren had no TDI or TDI without treatment needs (89.68%) Forty-five individuals had previously treated TDI (3.27%); among these, the types of treatment observed were composite restoration (n = 42), endodontic treatment and composite restoration (n = 1), removable partial denture (n = 1), and other treatment (occlusal adjustment) (n = 1). TDI with treatment needs was observed in 111 schoolchildren, representing 7.05% of the sample. The majority of cases needed composite restorations (n = 101), followed by those who needed endodontic treatment and composite restoration, composite restoration and bleaching, and removable partial denture. The distribution (mean, 95% CI) of domain-specific and overall CPQ₁₁₋₁₄ scores according to TDI treatment condition is shown in Table 2.

The association between the mean CPQ₁₁₋₁₄ score and the treatment condition for TDI is shown in Table 3. Unadjusted results revealed that the functional limitations domain was associated with TDI with treatment needs. Individuals presenting TDI with treatment needs experienced a higher average CPQ₁₁₋₁₄ score than individuals with no TDI or with TDI without treatment needs (RR = 1.22; 95% CI = 1.04–1.44). After adjusting for malocclusion, dental caries, gender, and socioeconomic status, the association remained significant (RR = 1.21; 95% CI = 1.05–1.39). The overall CPQ₁₁₋₁₄ score and all other domains were not associated with TDI.

Discussion

In this study, we assessed the impact of TDI with treatment needs on OHRQoL by using a large representative sample of 12-year-old South Brazilian schoolchildren. The main finding was that schoolchildren affected by TDI and needing clinical intervention had significantly higher adjusted mean CPQ₁₁₋₁₄ scores for function impairment than those with no TDI or affected by TDI with no treatment needs, indicating a significant but limited effect on quality of life. This is the first study, to our knowledge, that associated treatment needs due to trauma with OHRQoL, and this finding might help tailor clinical management and oral care policies of these injuries.

Whereas no overall association was observed between TDI and OHRQoL, a domain-specific analysis revealed significant association between TDI and function impairment. Schoolchildren presenting TDI with clinical treatment needs (e.g., restorations, crowns, root canal therapy) had a 1.21-fold higher adjusted mean CPQ₁₁₋₁₄ score than the reference group (no TDI/no treatment needs) in this domain, even after accounting for well-known cofactors and confounders (8, 21, 22). The negative impact of trauma with dental treatment needs on oral functions appears to be related to an impaired ability to apprehend and cut foods, loss of dental sealing, or hypersensitivity as a result of exposed dentin.

The present association between TDI with treatment needs and functional impairment is in agreement with previous studies (3, 5). Fakhruddin *et al.* (3), using a case-control study design, demonstrated that schoolchildren from Ontario, Canada, with untreated dental injuries were approximately 3-fold more

likely to report difficulty chewing than those without TDI. Cortes *et al.* (5), using an instrument to measure OHRQoL not specific for children, observed that untreated TDI had a negative impact on eating and enjoying food in Brazilian schoolchildren. In contrast, recent studies did not find an association between TDI and functional limitations (6-8). These discrepancies may be explained, at least in part, by the large proportion of mild trauma in the “untreated TDI group” and by the lack of differentiation between TDI with/without treatment needs in the statistical analysis.

Regarding treated injuries, the present findings do not corroborate previous studies that demonstrate that treated TDI has a negative impact on OHRQoL (2, 3, 6). A case-control study assessing the impact of treated TDI on the quality of life in Brazilian schoolchildren found that the treatment of TDI could restore the ability to smile, eat, and perform daily activities but could not eliminate the impact of trauma on the daily life of these children and adolescents (2). This finding was corroborated by a case-control study demonstrating that functional limitations as a result of TDI may continue even after treatment (3). Our findings indicate that the treatment provided for these children attenuated the negative effects of TDI on OHRQoL. This finding might be explained by Thelen *et al.* (7), who reported that TDI with unmet treatment needs was associated with a greater overall risk of effects on daily activities.

Although TDI may significantly affect the OHRQoL of affected individuals, its management appears to be commonly overlooked (6, 17). In this study, only 45 (3.27%) individuals with TDI had been treated, whereas treatment was not provided in 111 cases (7.05%). Another study from Brazil found a lower prevalence of untreated TDI (3.5%) in 11–14-year-old schoolchildren (6). In the

UK, less than 20% of traumatized teeth in children aged 12 years or younger was treated (17). Despite the low rates of treated injuries, it is important to mention that these studies did not assess treatment needs and many of the untreated cases may have no indication for treatment, such as small enamel fractures.

In conclusion, the present study demonstrated that TDI requiring treatment negatively affects the OHRQoL of 12-year-old schoolchildren from Southern Brazil, and this impact is related to oral functions. Treated TDI was not associated with a poorer OHRQoL in this population. With the increasing incidence of TDI in the modern society, dental professionals should be aware of the effects of TDI on OHRQoL as well as its prevention and management.

References

1. Caldas-Junior AF, Burgos MEA. A retrospective study of traumatic dental injuries in a brazilian dental trauma clinic. *Dental Traumatology* 2001;17: 250–53.
2. Ramos-Jorge ML, Bosco VL, Peres MA, Nunes AC. The impact of treatment of dental trauma on the quality of life of adolescents - a case-control study in southern brazil. *Dent Traumatol* 2007;23: 114-9.
3. Fakhruddin KS, Lawrence HP, Kenny DJ, Locker D. Impact of treated and untreated dental injuries on the quality of life of ontario school children. *Dent Traumatol* 2008;24: 309-13.
4. Foster Page LA, Thomson WM, Jokovic A, Locker D. Epidemiological evaluation of short-form versions of the child perception questionnaire. *Eur J Oral Sci* 2008;116: 538-44.
5. Cortes MI, Marcenes W, Sheiham A. Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12-14-year-old children. *Community Dent Oral Epidemiol* 2002;30: 193-8.
6. Bendo CB, Paiva SM, Torres CS, Oliveira AC, Goursand D, Pordeus IA, et al. Association between treated/untreated traumatic dental injuries and impact on quality of life of brazilian schoolchildren. *Health Qual Life Outcomes* 2010;8: 114.
7. Thelen DS, Trovik TA, Bårdsen A. Impact of traumatic dental injuries with unmet treatment need on daily life among albanian adolescents: A case-control study. *Dent Traumatol* 2011;27: 88-94.

8. Piovesan C, Antunes JL, Guedes RS, Ardenghi TM. Impact of socioeconomic and clinical factors on child oral health-related quality of life (cohrqol). *Qual Life Res* 2010;19: 1359-66.
9. Sgan-Cohen HD, Megnagi G, Jacoby Y. Dental trauma and its association with anatomic, behavioral, and social variables among fifth and sixth grade schoolchildren in jerusalem. *Community Dent Oral Epidemiol* 2005;33: 174–80.
10. Brazil. Primary education school census: *Educacenso* In: MEC/INEP, editor, 2010.
11. Marcenes W, Zabet NE, Traebert J. Socio-economic correlates of traumatic injuries to the permanent incisors in schoolchildren aged 12 years in Blumenau, Brazil. *Dent Traumatol* 2001;17: 222-6.
12. Jokovic A, Locker D, Guyatt G. Short forms of the child perceptions questionnaire for 11-14-year-old children (cpq11-14): Development and initial evaluation. *Health Qual Life Outcomes* 2006;4: 4.
13. Traebert J, de Lacerda JT, Thomson WM, Page LF, Locker D. Differential item functioning in a Brazilian-Portuguese version of the child perceptions questionnaire (cpq). *Community Dent Oral Epidemiol* 2010;38: 129-35.
14. Jokovic A, Locker D, Stephens M, Kenny D, Tompson B, Guyatt G. Validity and reliability of a questionnaire for measuring child oral-health-related quality of life. *J Dent Res* 2002;81: 459-63.
15. Foster Page LA, Thomson WM, Jokovic A, Locker D. Validation of the child perceptions questionnaire (cpq 11-14). *J Dent Res* 2005;84: 649-52.
16. Goursand D, Paiva SM, Zarzar PM, Ramos-Jorge ML, Cornacchia GM, Pordeus IA, et al. Cross-cultural adaptation of the child perceptions questionnaire 11-14 (cpq11-14) for the Brazilian Portuguese language. *Health Qual Life Outcomes* 2008;6: 2.
17. O'Brien M. *Children's dental health in the United Kingdom 1993. Report of dental survey, office of population censuses and surveys*. London: Her Majesty's Stationary Office; 1994.
18. WHO. *Oral health surveys: Basic methods*. Geneva; 1997.
19. ABEP Baorc-. Standard Brazilian economic classifications. Brazil, 2009.
20. Korn B, Graubard E. *Analysis of health surveys*. New York; 1999.
21. de Oliveira CM, Sheiham A. The relationship between normative orthodontic treatment need and oral health-related quality of life. *Community Dent Oral Epidemiol* 2003;31: 426-36.
22. Castro ReA, Portela MC, Leão AT, de Vasconcellos MT. Oral health-related quality of life of 11- and 12-year-old public school children in Rio de Janeiro. *Community Dent Oral Epidemiol* 2011;39: 336-44.

Table 1. Frequency distribution of sample by sociodemographic, and clinical characteristics in Brazilian schoolchildren

Variable	n (%)
<i>Gender</i>	
Female	758 (49.61)
Male	770 (50.39)
<i>Socioeconomic status</i>	
High	141 (9.23)
Mid-high	358 (23.43)
Mid-low	871 (57.00)
Low	158 (10.34)
<i>TDI index</i>	
No trauma	994 (65.05)
Enamel fracture only	380 (24.87)
Enamel-dentin fracture	138 (9.03)
Enamel-dentin fracture with pulp involvement	8 (0.52)
Tooth loss	1 (0.07)
Other (periodontal tissue)	7 (0.46)
<i>Dental caries</i>	
DMFT = 0	663 (43.40)
DMFT ≥ 1	865 (56.60)
<i>Malocclusion</i>	
DAI ≤ 25	532 (34.80)
DAI >25	996 (65.20)
Total	1,528 (100.00)

DMFT = Decayed, Missing and Filled Teeth; DAI = Dental Aesthetic Index

Table 2. Distribution of domain-specific and overall CPQ₁₁₋₁₄ scores according to treatment condition regarding TDI

Domain	No TDI/ No treatment need (n=1,372)		Treated (n=45)		Treatment need (n=111)		Total (n=1,528)	
	Mean (95% CI)	ref.	Mean (95% CI)	p	Mean (95% CI)	p	Mean (95% CI)	
Oral symptoms	4.15 (3.74-4.56)	ref.	4.48 (3.58-5.37)	0.198	4.44 (3.65-5.23)	0.183	4.18 (3.77-4.59)	
Functional limitations	2.96 (2.64-3.29)	ref.	3.39 (2.03-4.76)	0.385	3.63 (3.11-4.16)	0.132	3.02 (2.70-3.35)	
Emotional wellbeing	2.90 (2.48-3.31)	ref.	2.79 (1.89-3.69)	0.714	2.81 (1.94-3.69)	0.771	2.89 (2.49-3.28)	
Social wellbeing	2.33 (1.98-2.69)	ref.	2.03 (1.43-2.64)	0.427	2.84 (2.11-3.56)	0.210	2.36 (2.03-2.68)	
Overall CPQ₁₁₋₁₄	12.35 (10.98-13.72)	ref.	12.70 (10.58-14.83)	0.652	13.74 (11.70-15.78)	0.476	12.46 (11.21-13.72)	

Ref. reference group for statistical comparison

Table 3. Association between domain-specific and overall CPQ₁₁₋₁₄ scores and treatment condition regarding TDI in Brazilian schoolchildren (Poisson regression analysis) (n=1,528)

Domain		Unadjusted		Adjusted**	
		RR	95% CI	RR	95% CI
Oral symptoms	No TDI/No treatment need	ref.		ref.	
	Treated	1.07	0.95-1.22	1.11	0.97-1.28
	Treatment need	1.06	0.88-1.28	1.05	0.87-1.27
Functional limitations	No TDI/No treatment need	ref.		ref.	
	Treated	1.14	0.80-1.63	1.20	0.86-1.69
	Treatment need	1.22*	1.04-1.44	1.21*	1.05-1.39
Emotional wellbeing	No TDI/No treatment need	ref.		ref.	
	Treated	0.96	0.73-1.26	1.05	0.80-1.38
	Treatment need	0.97	0.70-1.34	0.96	0.71-1.31
Social wellbeing	No TDI/No treatment need	ref.		ref.	
	Treated	0.87	0.56-1.35	0.97	0.62-1.51
	Treatment need	1.21	0.92-1.59	1.15	0.88-1.51
Overall CPQ₁₁₋₁₄	No TDI/No treatment need	ref.		ref.	
	Treated	1.02	0.87-1.20	1.09	0.94-1.27
	Treatment need	1.11	0.91-1.34	1.09	0.92-1.29

* p<0.05

** Estimates are adjusted for gender, socioeconomic status, malocclusion, and dental caries; RR:Ratio of geometric means; ref.: reference category

Este estudo foi realizado para avaliar a prevalência, severidade e indicadores de risco de traumatismo dentário em dentes anteriores permanentes na população de escolares de 12 anos de Porto Alegre, além do impacto que um traumatismo dentário pode causar na qualidade de vida destes indivíduos. Uma alta prevalência de traumatismo dentário foi encontrada (34,95%), sendo a maioria (24,37%) representada por traumas leves (fraturas restritas ao esmalte dentário), enquanto traumas severos (fraturas envolvendo tecido dentinário ou mais graves) foram menos frequentes (10,43%). A presença de traumatismo dentário foi significativamente associada com o gênero masculino, nível socioeconômico mais baixo e ano escolar (alunos adiantados obtiveram menor ocorrência de traumatismo dentário). Quando a severidade do traumatismo dentário foi levada em conta, não observou-se associação significativa de traumatismo dentário com a situação socioeconômica.

Em relação às condições de tratamento, 1.372 indivíduos não apresentaram traumatismo dentário ou apresentaram algum traumatismo dentário sem necessidade de tratamento (89,68%). Apenas 45 indivíduos apresentaram traumatismo dentário previamente tratado (3,27%). Cento e onze indivíduos tinham necessidade de tratamento de traumatismo em algum dente (7,05%). Considerando os achados do presente estudo, um dente anterior fraturado causa algum impacto negativo na qualidade de vida

nesta faixa etária, sendo as funções orais comprometidas devido a um traumatismo dentário não tratado. Não foi encontrada associação de traumatismo dentário com sintomas orais, bem estar social e emocional.

1. Andreasen J, Andreasen F. Textbook and color atlas of dental trauma. 3 ed. Porto Alegre, RS: Artmed; 2001.
2. Marcenes W, Murray S. Social deprivation and traumatic dental injuries among 14-year-old schoolchildren in Newham, London. *Dental Traumatology*. 2001;17:17-21.
3. Glendor U. Epidemiology of traumatic dental injuries--a 12 year review of the literature. *Dent Traumatol*. 2008;24(6):603-11.
4. Caldas Jr AF, Burgos MEA. A retrospective study of traumatic dental injuries in a Brazilian dental trauma clinic. *Dental Traumatology*. 2001;17:250-3.
5. Onetto JE, Flores MT, Garbarino ML. Dental trauma in children and adolescents in Valparaiso, Chile. *Endod Dent Traumatol*. 1994;10(5):223-7.
6. Sgan-Cohen HD, Megnagi G, Jacobi Y. Dental trauma and its association with anatomic, behavioral, and social variables among fifth and sixth grade schoolchildren in Jerusalem. *Community Dent Oral Epidemiol*. 2005;33:174-80.
7. Soriano EP, et al. Prevalence and risk factors related to traumatic dental injuries in Brazilian schoolchildren. *Dental Traumatology*. 2007;23:232-40.
8. Fakhruddin SK, et al. Etiology and environment of dental injuries in 12- to 14-year-old Ontario schoolchildren. *Dental Traumatology*. 2008;24:305-8.
9. Traebert J, Peres MA, Blank V, Boell Rda S, Pietruza JA. Prevalence of traumatic dental injury and associated factors among 12-year-old school children in Florianopolis, Brazil. *Dent Traumatol*. 2003;19(1):15-8.
10. Traebert J, Bittencourt DD, et al. Aetiology and rates of treatment of traumatic dental injuries among 12-year-old school children in a town in southern Brazil. *Dental Traumatology*. 2006;22 173-8.
11. Nicolau B, Marcenes W, Sheiham A. Prevalence, causes and correlates of traumatic dental injuries among 13-year-olds in Brazil. *Dent Traumatol*. 2001;17(5):213-7.
12. Cavalcanti AL, et al. Traumatic anterior dental injuries in 7- to 12-year-old Brazilian children. *Dental Traumatology*. 2009;25:198-202.
13. Glendor U. Aetiology and risk factors related to traumatic dental injuries--a review of the literature. *Dent Traumatol*. 2009;25(1):19-31.

14. Al-Majed I, Murray JJ, Maguire A. Prevalence of dental trauma in 5-6- and 12-14-year-old boys in Riyadh, Saudi Arabia. *Dent Traumatol.* 2001;17(4):153-8.
15. Altun C, Ozen B, Esenlik E, Guven G, Gurbuz T, Acikel C, et al. Traumatic injuries to permanent teeth in Turkish children, Ankara. *Dent Traumatol.* 2009;25(3):309-13.
16. Artun J, Behbehani F, Al-Jame B, Kerosuo H. Incisor trauma in an adolescent Arab population: prevalence, severity, and occlusal risk factors. *Am J Orthod Dentofacial Orthop.* 2005;128(3):347-52.
17. Locker D. Prevalence of traumatic dental injury in grade 8 children in six Ontario communities. *Can J Public Health.* 2005;96(1):73-6.
18. Petti S, Tarsitani G. Traumatic injuries to anterior teeth in Italian schoolchildren: prevalence and risk factors. *Endod Dent Traumatol.* 1996;12(6):294-7.
19. S-Cohen HD, Megnagi G, Jacobi Y. Dental trauma and its association with anatomic, behavioral, and social variables among fifth and sixth grade schoolchildren in Jerusalem. *Community Dent Oral Epidemiol.* 2005;33:174-80.
20. Taiwo OO, Jalo HP. Dental Injuries in 12-year Old Nigerian students. *Dent Traumatol.* 2011.
21. Grimm S, Frazao P, Antunes JL, Castellanos RA, Narvai PC. Dental injury among Brazilian schoolchildren in the state of Sao Paulo. *Dent Traumatol.* 2004;20(3):134-8.
22. Traebert J, Bitencourt DD, et al. Aetiology and rates of treatment of traumatic dental injuries among 12-year-old school children in a town in southern Brazil. *Dental Traumatology.* 2006;22:173-8.
23. Traebert J, Marcon KB, Lacerda JT. [Prevalence of traumatic dental injuries and associated factors in schoolchildren of Palhoca, Santa Catarina State]. *Cien Saude Colet.* 2010;15 Suppl 1:1849-55.
24. Naidoo S, Sheihan A, Tzakos G. Traumatic dental injuries of permanent incisors in 11- to 13-year-old South African schoolchildren. *Dental Traumatology.* 2009;25:224-8.
25. David J, Astrom AN, Wang NJ. Factors associated with traumatic dental injuries among 12-year-old schoolchildren in South India. *Dent Traumatol.* 2009;25(5):500-5.
26. Jurgensen N, Petersen PE. Oral health and the impact of socio-behavioural factors in a cross sectional survey of 12-year old school children in Laos. *BMC oral health.* 2009;9:29.

27. Marcenes W, Zabet NE, Traebert J. Socio-economic correlates of traumatic injuries to the permanent incisors in schoolchildren aged 12 years in Blumenau, Brazil. *Dent Traumatol.* 2001;17(5):222-6.
28. Cortes MI, Marcenes W, Sheiham A. Prevalence and correlates of traumatic injuries to the permanent teeth of schoolchildren aged 9-14 years in Belo Horizonte, Brazil. *Dent Traumatol.* 2001;17(1):22-6.
29. Naidoo S, Sheiham A, Tsakos G. Traumatic dental injuries of permanent incisors in 11- to 13-year-old South African schoolchildren. *Dental Traumatology.* 2009;25:224-8.
30. Traebert J. Traumatismo dentário: um estudo de caso-controle de base populacional em escolares de 11 a 13 anos de idade e suas famílias, Biguaçu, SC, Brasil, 2001. Florianópolis: Universidade Federal de Santa Catarina; 2002.
31. Sandalli N, Cildir S, Guler N. Clinical investigation of traumatic injuries in Yeditepe University, Turkey during the last 3 years. *Dental Traumatology.* 2005;21:188-94.
32. Hamdan MA, Rajab LD. Traumatic injuries to permanent anterior teeth among 12-year-old schoolchildren in Jordan. *Community dental health.* 2003;20(2):89-93.
33. Marcenes W, al Beiruti N, Tayfour D, Issa S. Epidemiology of traumatic injuries to the permanent incisors of 9-12-year-old schoolchildren in Damascus, Syria. *Endod Dent Traumatol.* 1999;15(3):117-23.
34. Navabazam A, Farahani SS. Prevalence of traumatic injuries to maxillary permanent teeth in 9- to 14-year-old school children in Yazd, Iran. *Dent Traumatol.* 2010;26(2):154-7.
35. Petti S, Cairella G, Tarsitani G. Childhood obesity: a risk factor for traumatic injuries to anterior teeth. *Endod Dent Traumatol.* 1997;13(6):285-8.
36. Feliciano K, Caldas JA. A systematic review of the diagnostic classifications of traumatic dental injuries. *Dent Traumatol.* 2006;22:71-6.
37. Bastone EB, Freer TJ, McNamara JR. Epidemiology of dental trauma: a review of the literature. *Aust Dent J.* 2000;45(1):2-9.
38. WHO. Oral Health Surveys: Basic methods. Geneva 1997.
39. García-Godoy F. A classification for traumatic injuries to primary and permanent teeth. *J Pedod.* 1981;5(4):295-7.
40. O'Brien M. Children's dental health in the United Kingdom 1993. Report of dental survey, office of population censuses and surveys. London: Her Majesty's Stationary Office; 1994.

41. Beck JD. Risk revisited. *Community Dent Oral Epidemiol.* 1998;26(4):220-5.
42. Fletcher R, Fletcher S. *Epidemiologia Clínica: Elementos Essenciais.* 4ª ed. Porto Alegre: Artmed; 2006. 288 p.
43. Marcenes W, Murray S. Social deprivation and traumatic dental injuries among 14-year-old schoolchildren in Newham, London. *Dental Traumatology.* 2001;17:17-21.
44. Nguyen QV, Bezemer PD, Habets L, Prah Andersen B. A systematic review of the relationship between overjet size and traumatic dental injuries. *Eur J Orthod.* 1999;21(5):503-15.
45. Forsberg CM, Tedestam G. Etiological and predisposing factors related to traumatic injuries to permanent teeth. *Swed Dent J.* 1993;17(5):183-90.
46. Soriano EP, Caldas-Junior A, Goes PSA. Risk factors related to traumatic dental injuries in Brazilian schoolchildren. *Dental Traumatology.* 2004;20:246-50.
47. Traebert J, Almeida IC, Garghetti C, Marcenes W. [Prevalence, treatment needs, and predisposing factors for traumatic injuries to permanent dentition in 11-13-year-old schoolchildren]. *Cad Saude Publica.* 2004;20(2):403-10.
48. Soriano EP, Caldas Ade F, Jr., De Carvalho MV, Caldas KU. Relationship between traumatic dental injuries and obesity in Brazilian schoolchildren. *Dent Traumatol.* 2009;25(5):506-9.
49. Nicolau B, Marcenes W, Sheiham A. The relationship between traumatic dental injuries and adolescents' development along the life course. *Community Dent Oral Epidemiol.* 2003;31(4):306-13.
50. Soriano EP, Caldas Jr A, Go´es PSA. Risk factors related to traumatic dental injuries in Brazilian schoolchildren. *Dental Traumatology.* 2004;20:246-50.
51. Maltz M, Barbachan e Silva B. [Relationship among caries, gingivitis and fluorosis and socioeconomic status of school children]. *Rev Saude Publica.* 2001;35(2):170-6.
52. Susin C, Haas AN, Valle PM, Oppermann RV, Albandar JM. Prevalence and risk indicators for chronic periodontitis in adolescents and young adults in south Brazil. *J Clin Periodontol.* 2011;38(4):326-33.
53. Susin C, Haas AN, Opermann RV, Albandar JM. Tooth loss in a young population from south Brazil. *J Public Health Dent.* 2006;66(2):110-5.
54. Warnakulasuriya S. Significant oral cancer risk associated with low socioeconomic status. *Evid Based Dent.* 2009;10(1):4-5.

55. Bendo CB, Scarpelli AC, Vale MP, Araújo Zarzar PM. Correlation between socioeconomic indicators and traumatic dental injuries: a qualitative critical literature review. *Dent Traumatol.* 2009;25(4):420-5.
56. Fakhruddin KS, Lawrence HP, Kenny DJ, Locker D. Impact of treated and untreated dental injuries on the quality of life of Ontario school children. *Dent Traumatol.* 2008;24(3):309-13.
57. Malikaew P, Watt RG, Sheiham A. Associations between school environments and childhood traumatic dental injuries. *Oral Health Prev Dent.* 2003;1(4):255-66.
58. Soriano EP, Caldas Ade F, Jr., Diniz De Carvalho MV, Amorim Filho Hde A. Prevalence and risk factors related to traumatic dental injuries in Brazilian schoolchildren. *Dent Traumatol.* 2007;23(4):232-40.
59. Paschoal MAB, Gurgel CV, Neto NL, Kobayashi TY, Silva SMBd, Abdo RCC, et al. Perfil de tratamento de urgência de crianças de 0 a 12 anos de idade, atendidas no Serviço de Urgência Odontológica da Faculdade de Odontologia de Bauru da Universidade de São Paulo. *Odontol Clín-Cient.* 2010;9(3): 243-7.
60. Rowley ST, Sheller B, Williams BJ, Mancl L. Utilization of a hospital for treatment of pediatric dental emergencies. *Pediatric dentistry.* 2006;28(1):10-7.
61. Agostini FG, Flaitz CM, Hicks MJ. Dental emergencies in a university-based pediatric dentistry postgraduate outpatient clinic: a retrospective study. *ASDC journal of dentistry for children.* 2001;68(5-6):316-21, 00-1.
62. Ladrillo TE, Hobdell MH, Caviness AC. Increasing prevalence of emergency department visits for pediatric dental care, 1997-2001. *Journal of the American Dental Association (1939).* 2006;137(3):379-85.
63. Adekoya-Sofowora CA. Traumatized anterior teeth in children: a review of the literature. *Niger J Med.* 2001;10(4):151-7.
64. Robertson A, Robertson S, Noren JG. A retrospective evaluation of traumatized permanent teeth. *International journal of paediatric dentistry / the British Paedodontic Society [and] the International Association of Dentistry for Children.* 1997;7(4):217-26.
65. O'Brien M. Children's dental health in the United Kingdom 1993. Report of dental survey, office of population censuses and surveys. London: Her Majesty's Stationary Office; 1994.
66. Marcenes W, Murray S. Changes in prevalence and treatment need for traumatic dental injuries among 14-year-old children in Newham, London: a deprived area. *Community dental health.* 2002;19(2):104-8.

67. Nguyen PM, Kenny DJ, Barrett EJ. Socio-economic burden of permanent incisor replantation on children and parents. *Dent Traumatol.* 2004;20(3):123-33.
68. Glendor U, Halling A, Andersson L, Andreasen JO, Klitz I. Type of treatment and estimation of time spent on dental trauma--a longitudinal and retrospective study. *Swedish dental journal.* 1998;22(1-2):47-60.
69. Lygidakis NA, Marinou D, Katsaris N. Analysis of dental emergencies presenting to a community paediatric dentistry centre. *International journal of paediatric dentistry / the British Paedodontic Society [and] the International Association of Dentistry for Children.* 1998;8(3):181-90.
70. Foster Page LA, Thomson WM, Jokovic A, Locker D. Epidemiological evaluation of short-form versions of the Child Perception Questionnaire. *Eur J Oral Sci.* 2008;116(6):538-44.
71. Cortes MI, Marcenes W, Sheiham A. Impact of traumatic injuries to the permanent teeth on the oral health-related quality of life in 12-14-year-old children. *Community Dent Oral Epidemiol.* 2002;30(3):193-8.
72. Ramos-Jorge ML, Bosco VL, Peres MA, Nunes AC. The impact of treatment of dental trauma on the quality of life of adolescents - a case-control study in southern Brazil. *Dent Traumatol.* 2007;23(2):114-9.
73. Bendo CB, Paiva SM, Torres CS, Oliveira AC, Goursand D, Pordeus IA, et al. Association between treated/untreated traumatic dental injuries and impact on quality of life of Brazilian schoolchildren. *Health Qual Life Outcomes.* 2010;8:114.
74. Thelen DS, Trovik TA, Bårdsen A. Impact of traumatic dental injuries with unmet treatment need on daily life among Albanian adolescents: a case-control study. *Dent Traumatol.* 2011;27(2):88-94.
75. Piovesan C, Antunes JL, Guedes RS, Ardenghi TM. Impact of socioeconomic and clinical factors on child oral health-related quality of life (COHRQoL). *Qual Life Res.* 2010;19(9):1359-66.

AMOSTRAGEM

A proporção utilizada para a determinação do número de estudantes por tipo de escola foi: 18,85% estudantes de escola particular e 81,15% estudantes de escola pública, proporcionalmente à população base (tabela 1). A figura 1 apresenta o fluxograma da amostragem deste estudo.

Tabela 1 - População base dividida por ETA, tipo de escola e gênero

ETA		Masculino	Feminino	TOTAL
1: Moinhos de Vento	Privada	569	524	1093
	Pública	692	684	1376
2: José Loureiro da Silva/ Menino Deus	Privada	749	714	1463
	Pública	2943	2822	5765
3: São João/ Ilha da Pintada	Privada	917	881	1798
	Pública	2858	2831	5689
4: Tristeza/Lami	Privada	174	177	351
	Pública	1392	1336	2728
5: Lomba do Sabão	Pública	554	557	1111
TOTAL		10848	10526	21374

VARIÁVEL DE PESO

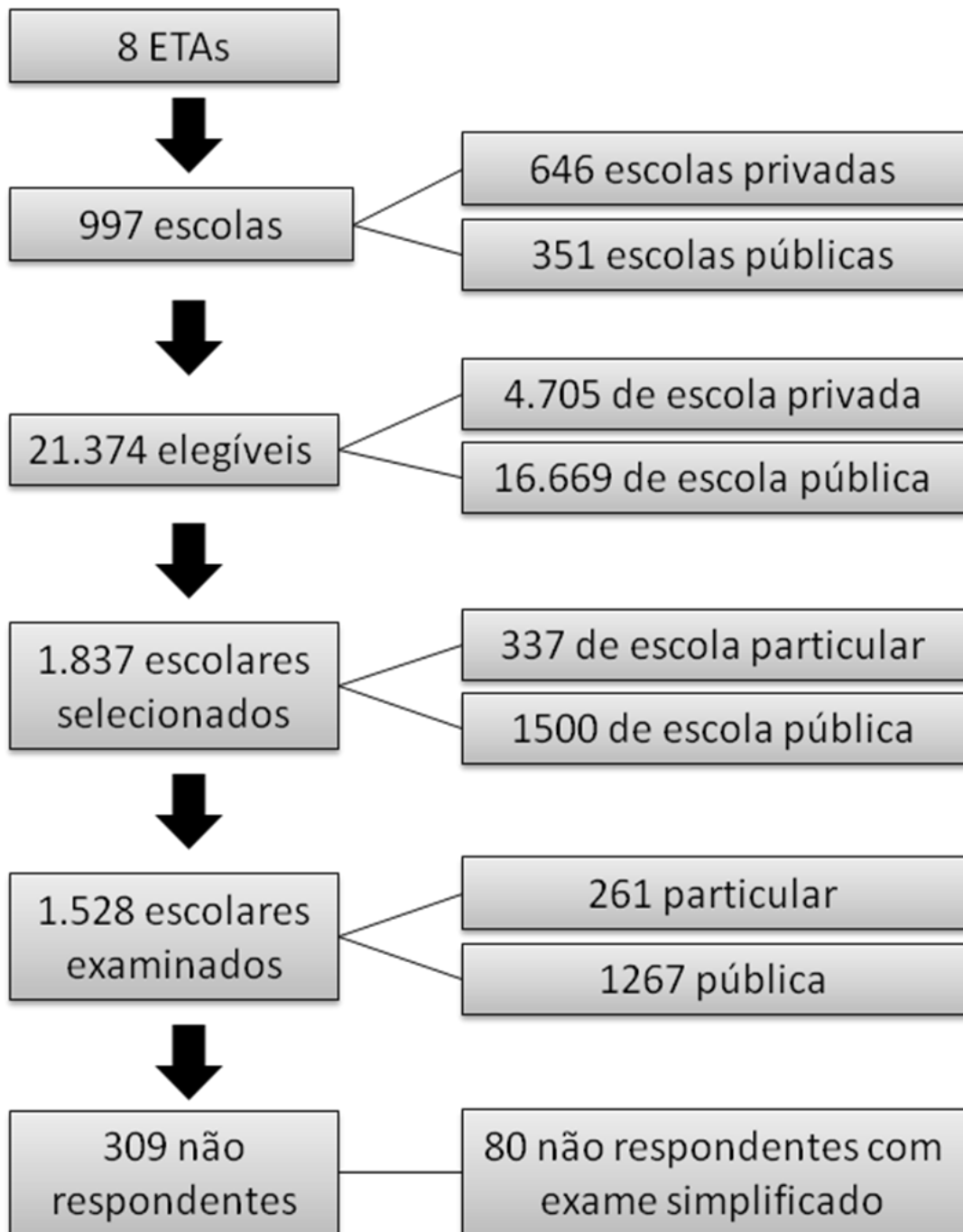
Com o objetivo de minimizar o viés de não-participação, uma variável de peso foi criada e utilizada em todas as análises realizadas. Para isto, foi utilizada uma proporção através da caracterização da população base, descrita na tabela 1. Esta proporção representa quantos sujeitos cada um dos estudantes participantes está representando no total da população. Por exemplo: cada estudante do gênero feminino, de escola privada e da ETA 1 representa 15,41 estudantes com as mesmas características na população base.

Cálculo variável de peso =

NÚMERO REPRESENTANTE NA POPOPULAÇÃO BASE

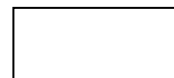
NÚMERO DE EXAMINADOS

FLUXOGRAMA AMOSTRAGEM



TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Universidade Federal do Rio Grande do Sul
Faculdade de Odontologia



TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Estudo da prevalência de cárie dentária, gengivite e fluorose dentária em escolares de Porto Alegre, RS: em 1998 e 2009

- 1. Objetivo do estudo:** Estudar a ocorrência de gengivite (inflamação na gengiva), cárie, fluorose (manchas nos dentes ocasionadas pela ingestão de flúor em excesso durante o seu período de formação), erosão (desgastes nos dentes) e traumatismos dentários (fratura) em estudantes de 12 anos de idade residentes em Porto Alegre-RS;
- 2. Seleção dos indivíduos:** As escolas e os estudantes foram sorteados aleatoriamente;
- 3. Duração:** A participação na pesquisa consiste no preenchimento de um questionário pelos pais ou responsáveis e um pelo estudante e exame odontológico da criança, a ser realizado em um único dia, com duração prevista de aproximadamente dez minutos.
- 4. Procedimentos:** Os indivíduos terão seus dentes limpos com escova, fio e pasta dental, fornecidos pela equipe da pesquisa e examinados pela cirurgiã-dentista Luana Severo Alves (CRO-RS 16588) (estudante de doutorado da UFRGS).
- 5. Importância do estudo:** Este levantamento epidemiológico será muito importante para avaliação do estado atual de saúde bucal das crianças de nossa cidade.
- 6. Danos:** Não existem danos previstos. Todo o instrumental (espelho, pinça e sonda) utilizado estará devidamente esterilizado. Somente participarão dos exames os estudantes que assim concordarem e assinarem este termo, juntamente com a assinatura dos pais ou responsáveis.
- 7. Benefícios:** Os pais ou responsáveis conhecerão as condições de saúde bucal de seu filho e receberão, posteriormente, um relatório do exame realizado, assim como a indicação de lugares que ofereçam atendimento odontológico gratuito. O estudante receberá uma escova dental.
- 8. Confidencialidade:** As informações contidas nos questionários e a identidade dos estudantes ficarão sob o poder restrito dos pesquisadores e não serão divulgadas nos trabalhos resultantes desta pesquisa.

A participação na pesquisa é totalmente voluntária e o indivíduo tem a liberdade de se recusar a participar ou retirar seu consentimento em qualquer momento do estudo sem nenhum tipo de penalidade.

No caso de dúvidas ou acontecimentos associados à pesquisa, o participante poderá entrar em contato com a pesquisadora Luana Severo Alves, através do telefone 3308 5193 ou com a orientadora deste projeto, profª. Drª. Marisa Maltz (3308 5247), e terá a garantia de resposta a qualquer pergunta ou informação extra.

Confirmo que entendi a natureza da pesquisa e autorizo a participação do estudante

Assinatura dos pais ou responsável: _____

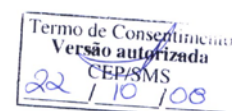
Confirmo que entendi a natureza da pesquisa e me disponho a participar voluntariamente.

Assinatura do estudante: _____

Pesquisadora Luana Severo Alves: _____

Porto Alegre, ____ de _____ de 20__

Comitê de Ética em Pesquisa da Faculdade de Odontologia da UFRGS: 3308 5187
Comitê de Ética em Pesquisa da Secretaria Municipal de Saúde de Porto Alegre-RS: 3212 4623



PARECER COMITÊ DE ÉTICA DA UFRGS

COMITÊ DE ÉTICA EM PESQUISA

RESOLUÇÃO

O Comitê de Ética em Pesquisa e a Comissão de Pesquisas da Faculdade de Odontologia da Universidade Federal do Rio Grande do Sul analisaram o Projeto:

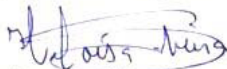
Número: 299/08

Título: ESTUDO DA PREVALÊNCIA DE CÁRIE DENTÁRIA, GENGIVITE E FLUROSE DENTÁRIA EM ESCOLARES BRASILEIROS: EM 1998 E 2008.

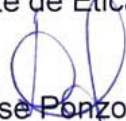
Investigador(es) principal(ais): Professores Berenice Barbachan e Silva, Marisa Maltz, Cristiano Susin e CD. Luana Severo Alves.

O Projeto foi aprovado na reunião do dia 14/08/2008, Ata nº 08/08 do Comitê de Ética em Pesquisa e da Comissão de Pesquisas, da UFRGS, por estar adequado ética e metodologicamente de acordo com a Resolução 196/96 do Conselho Nacional de Saúde.

Porto Alegre, 15 de agosto de 2008.



Prof^a. Heloísa Emília Dias da Silveira
Coordenadora do Comitê de Ética em Pesquisas



Prof^a. Deise Ponzoni
Coordenadora da Comissão de Pesquisas

PARECER COMITÊ DE ÉTICA DA PREFEITURA MUNICIPAL DE PORTO ALEGRE



Prefeitura Municipal de Porto Alegre Secretaria Municipal de Saúde Comitê de Ética em Pesquisa **PARECER CONSUBSTANCIADO**


Pesquisador (a) Responsável: Mariza Maltz
Equipe executora:
Registro do CEP: 288 Processo Nº. 001.049155.08.3
Instituição onde será desenvolvido: Escolas municipais
Utilização: TCLE
Situação: APROVADO

O Comitê de Ética em Pesquisa da Secretaria Municipal de Saúde de Porto Alegre analisou o processo Nº.001.049155.08.3, referente ao projeto de pesquisa: “**Estudo da prevalência de cárie dentária, gengivite e fluorose dentária em escolares de Porto Alegre, RS: em 1998 e 2009**”, tendo como pesquisador responsável Mariza Maltz cujo objetivo é “Geral: Estudar a prevalência de cárie dentária, gengivite e fluorose dentária em escolares de 12 anos do município de Porto Alegre, RS, 2008 e comparar os dados obtidos com dados coletados em 1998. Objetivos específicos: Verificar as condições atuais de saúde bucal de escolares de 12 anos regularmente matriculados em escolas públicas e particulares do município de Porto Alegre, RS;• Avaliar a presença de modificações na prevalência de cárie dentária,gengivite e fluorose dentária na população estudada nos últimos dez anos;• Avaliar a existência de associação entre variáveis demográficas, socioeconômicas, comportamentais e as doenças bucais”.

Assim, o projeto preenche os requisitos fundamentais das resoluções. O Comitê de Ética em Pesquisa segue os preceitos das resoluções CNS 196/96, 251/97 e 292/99, sobre as Diretrizes e Normas Regulamentadoras de Pesquisa Envolvendo Seres Humanos, do Conselho Nacional de Saúde / Conselho Nacional de Ética em Pesquisa / Agência nacional de Vigilância Sanitária. Em conformidade com os requisitos éticos, classificamos o presente protocolo como **APROVADO**.

O Comitê de Ética em Pesquisa, solicita que :

1. Enviar primeiro relatório parcial em seis meses a contar desta data;
2. Informar imediatamente relatório sobre qualquer evento adverso ocorrido;
3. Comunicar qualquer alteração no projeto e no TCLE;
4. Entregar junto com o relatório, todos os TCLE assinados pelos sujeitos de pesquisas e a apresentação do trabalho.
5. Após o término desta pesquisa, o pesquisador responsável deverá apresentar os resultados junto à equipe da unidade a qual fez a coleta de dados e/ou entrevista, inclusive para o Conselho Local da Unidade de Saúde.

Porto Alegre, 22/10/08

Elen Maria Borba
Coordenadora do CEP