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ESTUDO EPIDEMIOLÓGICO E TRANSLACIONAL SOBRE DOR EM ODONTOLOGIA

Faculdade de Odontologia
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Dissertação apresentada ao Programa de Mestrado Profissional em Odontologia, da Faculdade de Odontologia da Universidade Federal de Minas Gerais, como requisito parcial à obtenção do grau de Mestre em Odontologia - área de concentração em Saúde Pública.

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Coorientador: Prof. Dr. Mauro Henrique Nogueira Guimarães de Abreu

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PROGRAMA DE PÓS-GRADUAÇÃO EM ODONTOLOGIA EM SAÚDE PÚBLICA/MP

FOLHA DE APROVAÇÃO

Estudo epidemiológico e translacional sobre dor em odontologia

RICARDO LUIZ DE BARRETO ARANHA

Dissertação submetida à Banca Examinadora designada pelo Colegiado do Programa de Pós-Graduação em Odontologia em Saúde Pública/MP, como requisito para obtenção do grau de Mestre, área de concentração Saúde Pública.

Aprovada em 21 de dezembro de 2018, pela banca constituída pelos membros:

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Belo Horizonte, 21 de dezembro de 2018.

Dedico este trabalho a minha família, a meus orientadores e a todos os autores e pesquisadores do passado e do presente que permitiram e permitem a evolução da ciência, além de sua disseminação em nossa sociedade.

RESUMO

A dor, definida como uma experiência sensorial e emocional desagradável associada a um dano tecidual real ou potencial pode receber diferentes denominações dependendo do local anatômico de onde se origina. A dor orofacial é reconhecida como “dor localizada acima do pescoço, na frente da linha das orelhas e abaixo da linha orbitomeatal, bem como dentro da cavidade oral”. Ela inclui, dentre outras, a dor de origem dentária, a mais prevalente, e a disfunção temporomandibular (DTM), condição de dor ou disfunção musculoesquelética que atinge a face em suas estruturas mastigatórias. A dor dentária é muitas vezes incapacitante, sendo um problema de saúde pública. O presente trabalho objetivou a avaliação da dor dentária na população adulta de Minas Gerais (Brasil) (35 a 44 anos) e sua associação com fatores biológicos e sócioeconômicos, além de elaborar, como produto técnico, material de nível científico com base em pesquisa translacional para o dentista clínico geral sobre os tópicos relevantes na área de bruxismo e disfunção temporomandibular. Para avaliação da dor dentária foram utilizados dados secundários obtidos do levantamento epidemiológico SB Minas Gerais 2012. Como variável dependente estabeleceu-se a dor de dente reportada nos últimos 6 meses, e as covariáveis foram: domínio (capital, interior I e II), sexo, cor da pele ou raça, renda familiar, histórico de cárie de raiz, condição periodontal, necessidade de tratamento dentário e última consulta odontológica. Como um segundo nível, variáveis municipais foram abordadas: IDH, analfabetismo, desemprego, renda de até metade do salário mínimo, renda de até um quarto do salário mínimo, cobertura das equipes de saúde bucal, acesso ao serviço dentário individual e média de escovação supervisionada. A população avaliada compreendeu 1.182 indivíduos (n=1,182). Um modelo de regressão logística multinível foi usado para inferir associação, considerando ao final uma significância de 5%. Os dados foram analisados no programa IBM SPSS Software versão 22.0, e a análise multinível realizada no HLM 6.08. Como resultado, 21.1% da amostra relatou dor dentária nos últimos 6 meses, e houve associação entre dor dentária e nível baixo de renda individual, cárie de raiz, condição periodontal e necessidade de tratamento ($p<0,05$). O aumento de um ponto porcentual na taxa de indivíduos com renda até um quarto do salário mínimo aumentou em 3% a chance de dor dentária em adultos em MG. Concluiu-se que fatores sócio demográficos e econômicos relacionaram-se à dor de dente na população avaliada, o que reforça a necessidade de uma maior abordagem destes fatores a fim de auxiliar o enfrentamento deste importante problema de saúde pública. Como produto técnico, foram elaborados dois artigos de revisão translacional, que por sua vez intenciona transmitir de forma sintética e com linguagem acessível conhecimentos de áreas específicas da odontologia. Os temas abordados, prementes na área odontológica, foram a atualização e a adequada abordagem clínica de pacientes com bruxismo e/ou disfunções temporomandibulares. Concluiu-se que, exceto para uso de placas oclusais, não há evidência suficiente para se sustentar qualquer abordagem terapêutica no bruxismo. Também não há evidência para a sustentação de tratamentos oclusais invasivos para bruxismo ou DTM. Recomenda-se cautela no planejamento protético destes pacientes.

Palavras-chave: Odontalgia. Fatores socioeconômicos. Brasil. Temporomandibular. Bruxismo.

ABSTRACT

Epidemiological and translational study about pain in dentistry

Pain, defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, receive different denominations depending on its origin. Orofacial pain is classified as orbitomeatal as well as pain within the oral cavity. It includes the most prevalente, toothache, and temporomandibular disorder (TMD), a musculoskeletal pain or dysfunction condition that affects the masticatory system. Toothache is often disabling and is also a public health problem. This study aimed the evaluation of toothache in adult population from the state of Minas Gerais (Brazil) (35 a 44 anos), and its association with biological and socioeconomic factors, besides the elaboration of scientific level material on relevant topics around bruxism and temporomandibular disorders by translational review, aiming the general practioner. Regarding toothache, secondary data from SB Minas Gerais 2012 epidemiological databank were collected. Dependent variable was pain felt in the last 6 months. As covariables: domains (capital, interior I and II); sex; race / skin color; familiar wage; root caries history; periodontal condition, dental need treatment, last dental appointment). As a second level, municipal variables were assessed: HDI, illiteracy, unemployment, up to half minimum wage, up to quarter minimum wage, health team coverage, access to individual dental service and supervisioned tooth brushing average. Assessed population comprehended 1.182 individuals (n=1,182). A multilevel logistic regression statistical model was used to infer association between different levels, considering 5% significance in the end. The data were processed in the IBM SPSS Software version 22.0 program and multilevel analysis was undertaken in HLM 6.08. As a result, 21.1% of the sample reported toothache in the last 6 months, and association was found between pain and higher income (this one as protective factor), root caries, periodontal condition and treatment need, at individual level ($p < 0.05$). The one-percentage-point increase in group rated in “up to quarter minimum wage” increases pain risk by 3% for adults in MG. In conclusion, sociodemographic factors are related with toothache in Minas Gerais` adult population, which reinforces the need to adress those factors in order to better assist people upon toothache, an important public health problem. As a technical product, two translational review articles were formulated, synthesizing in plain language specific dental knowledge to general practioner. The topics discussed were the upgrade and the proper approach in clinical practice to patients with bruxism and / or temporomandibular disorders. As conclusions, except for oral appliances, there is no suficiente evidence to support any therapeutic method for bruxism. There is also no evidence to support invasive occlusal procedures for bruxismo or TMD. Caution on the prosthodontic planning for these patients are recommended, and they must be previously treated by noninvasive therapeutic resources.

Keywords: Toothache. Socioeconomic factors. Brazil. Temporomandibular. Bruxism.

LISTA DE QUADROS

LISTA DE ABREVIATURAS E SIGLAS

ASB	Auxiliar em Saúde Bucal
ATM	Articulação Temporomandibular
Ceo - d	Dentes decíduos cariados com extração indicada e obturados
COEP	Comitê de Ética em Pesquisa
CPI	Índice Periodontal Comunitário
CPOD	Dentes Cariados Perdidos e Obturados
DATASUS	Departamento de informática do SUS
DTM	Disfunção Temporomandibular
HLM	*Hierarchical Linear and Nonlinear Modeling*
IASP	*International Association for the Study of Pain*
IBGE	Instituto Brasileiro de Geografia e Estatística
IBM	*International Business Machines*
ICMS	Imposto sobre Circulação de Mercadorias e Serviços
IDH	Índice de Desenvolvimento Humano
IPC	Índice Periodontal Comunitário
NCI	*National Cancer Institute*
OMS	Organização Mundial de Saúde
OR	*Odds Ratio*
PDA	*Personal Digital Assistant*
PIP	Perda de Inserção Periodontal
SB	Saúde Bucal
SES MG	Secretaria de Saúde do Estado de Minas Gerais
SPSS	*Statistical Package for the Social Sciences*
TCLE	Termo de Consentimento Livre e Esclarecido
UFMG	Universidade Federal de Minas Gerais
UK	*United Kingdom* (Reino Unido)
UNDP	*United Nations Development Programme*

SUMÁRIO

1 CONSIDERAÇÕES INICIAIS

1.1 Dor / Dor dentária

A dor é definida como “uma experiência sensorial e emocional desagradável associada a um dano tecidual real ou potencial”, segundo a Associação Internacional para o Estudo da Dor (*International Association for the Study of Pain*- IASP; MERSKEY & BOGDUK, 1994). Dependendo do local onde a dor se origina ela pode receber diferentes denominações. A dor orofacial é reconhecida como “dor localizada acima do pescoço, à frente da linha das orelhas e abaixo da linha orbitomeatal, bem como dentro da cavidade oral” (ZAKRZEWSKA; HAMLYN, 1999). Ela inclui, dentre outras, a dor de origem estritamente dentária, também referida como odontogênica, e as disfunção temporomandibular (DTM).

A dor dentária é descrita como uma dor que ocorre no dente e em estruturas vizinhas. É originada pelo próprio elemento dentário ou pela mucosa que o circunda, ou ainda pela estrutura óssea adjacente. É sentida como dor constante ou intermitente que não cessa facilmente, podendo ser estimulada por mudança de temperatura, como ocorre na ingestão de bebidas frias, ou por pressão sobre o elemento dentário, como ocorre na mastigação (COHEN; HARGREAVES, 2006). É reconhecida como a dor aguda de maior prevalência na região orofacial (LEUNG; McMILLAN; WONG, 2008; McGUIRRE *et al*., 2008; BAGRAMIAN; GARCIA-GODOY; VOLPE, 2009; CAVALHEIRO *et al*., 2016).

A terminologia para a dor utilizada na literatura em epidemiologia é bastante inconsistente. Para alguns autores, “dor dentária” não seria o termo mais adequado, pois esta pode se originar de tecidos adjacentes à estrutura dentária. Sendo assim, “dor oral” seria um termo mais abrangente e correto. “Dor oral” seria a que ocorre na boca e “dor orofacial” eventualmente poderia englobar o pescoço e a cabeça. Uma melhor adequação destes termos em futuros trabalhos seria desejável (SHARAV, 1994; MACFARLANE; BEASLEY; MACFARLANE, 2014). No atual estudo, optamos pelo termo “dor dentária” para nos referirmos à dor originada no dente e estruturas adjacentes. Ademais, a categorização da dor dentária como “crônica” é questionável, uma vez que ela é comumente derivada de patologias dentárias agudas detectáveis e que varia e modifica consideravelmente ao longo do tempo (DE LEEUW; KLASSER, 2013). Alguns estudos epidemiológicos incorporam

esta categorização, o que pode significar um viés de classificação, o que pode interferir nos resultados finais (LEUNG; McMILLAN; WONG, 2008).

A dor dentária tem como características elevada prevalência e morbidade associadas, como impacto psicológico e prejuízo no sono (LEUNG; McMILLAN; WONG, 2008; McGUIRRE *et al*., 2008). A experiência da dor originada nos dentes gera sofrimento e repercussão na vida social, psicológica e financeira do indivíduo, além de impacto na macroeconomia por perda de horas de trabalho e produtividade. Vários estudos epidemiológicos têm sido conduzidos com enfoque na dor dentária (COMETTO; CAMPBELL, 2016; AYO-YUSUF; NAIDOO, 2016; HAMIDI *et al*., 2017). O impacto desta dor pode ser agravado por fatores socioeconômicos (VARGAS; MACEK; MARCUS, 2000; BASTOS; GIGANTE; PERES, 2008; MACFARLANE; BEASLEY; MACFARLANE, 2014), alguns dos quais relacionados à baixa posição social e à maior dificuldade de acesso e realização efetiva dos serviços de saúde em todos os níveis de atenção (VARGAS; MACEK; MARCUS, 2000; PAU; CROUCHER; MARCENES, 2007).

A cárie dentária é bastante associada a episódios de dor dentária (CONSTANTE *et al*., 2012; BASTOS; GIGANTE; PERES, 2008; ARDENGHIL; PIOVESAN; ANTUNES, 2013) sendo considerada um problema fundamental de saúde pública a ser resolvido, o que requer adequada atenção, esforço e planejamento da gestão em saúde (BAGRAMIAN; GARCIA-GODOY; VOLPE, 2009).

Ravagui, Quinonez e Allison (2013), avaliando dados epidemiológicos canadenses para dor, verificaram que 11,7% da população estudada reportaram dor persistente ou contínua em qualquer local de sua boca nos últimos 12 meses. A dor foi ligeiramente mais frequente em mulheres e maior entre jovens adultos de ambos os sexos e entre indivíduos que evitavam a atenção profissional odontológica pelo custo. Também foi frequente entre aqueles que nunca tiveram uma consulta dentária ou o fizeram apenas em casos de urgência. Indivíduos que relataram escovar frequentemente os dentes reportaram menos dor, sendo ela também associada à presença de cáries não tratadas.

Um estudo realizado na África do Sul (AYO-YUSUF; NAIDOO, 2016) com indivíduos maiores de 16 anos, avaliou dados demográficos, socioeconômicos, estado de saúde auto-relatado, experiência de dor nos seis últimos meses na boca ou maxilares (dentes, gengivas, tecidos ao redor da boca, articulação temporomandibular) e custos envolvidos. Verificou-se que a prevalência de dor foi de

19,4%, sendo a “dor dentária” mais comumente reportada (78,9%). Dentre a parcela mais rica da amostra, a maioria procurava o serviço privado de saúde (64,7%), enquanto os mais pobres tendiam a procurar o serviço público (45%). Em áreas pobres, 21% dos indivíduos pesquisados afirmaram reagir à dor em sua primeira manifestação “fazendo nada”, talvez influenciados pela ausência do serviço de saúde na região, dificuldade de acesso ou por uma cultura de maior tolerância à dor. O custo individual para dor mostrou-se diferenciado para pobres e ricos, pelo fato de os últimos possuírem mais seguros privados de saúde e os primeiros realizarem mais pagamentos em dinheiro em clínicas particulares, considerando a dificuldade de atendimanto no setor público. A perda em produtividade e perda de dias de trabalho também contribuiu para este diferencial.

Outro trabalho realizado no Reino Unido (MACFARLANE; BEASLEY; MACFARLANE, 2014), com indivíduos de 37 a 73 anos, avaliou dor na face e região bucal e mostrou uma baixa prevalência deste tipo de dor (1,9%). A dor foi maior entre as mulheres (2,4%) e na faixa etária de 51-55 anos (2,2%). A dor também foi associada a relatos no último ano de úlceras bucais, dor gengival, dor dental e perdas dentárias. Além disso, foi relacionada a comorbidades dolorosas em outras áreas como dor de cabeça, pernas ou região lombar.

Recentemente Joury *et al*. (2018), utilizando questionários validados, avaliaram a prevalência ao longo do último mês de dor orofacial e de suas subdivisões (dente/dentes, gengiva, bochecha, mandíbula, articulação mandibular, língua, palato e/ou assoalho da boca), além de suas relações com questões socioeconômicas e sócio demográficas e impacto da condição bucal na vida diária, em uma região periférica socialmente vulnerável e culturalmente diversificada a leste de Londres (UK). A amostra representativa foi de “adultos” entre 16 e 65 anos (média de 38,3). Os resultados mostraram uma prevalência de dor orofacial de 30,2%, sendo 27,5% representados por suas subdivisões intraorais. Destas últimas, a dor dentária apresentou a maior prevalência (74,2%), perfazendo 20,4% do total geral. A diferença da dor orofacial e de todos seus subtipos (intra e extra orais) entre os indivíduos que moravam em áreas mais favorecidas socialmente para aqueles do extrato menos favorecido alcançou 11% em desfavor dos últimos, refletindo sua provável combinação de mais doenças (cárie dentária e doença periodontal) e mais dificuldade no acesso aos serviços de saúde. Ao final, a dor orofacial não mediou

indiretamente a relação entre a vulnerabilidade das localidades e o impacto oral na vida diária.

No Brasil, Hafner *et al*. (2013) avaliaram dados sobre dor dentária em adultos com base no levantamento epidemiológico SB Brasil 2010. Os relatos de dor e aspectos correlatos foram investigados, focando no sintoma e na intensidade nos últimos seis meses. A prevalência de dor dentária atingiu 21% da população, com uma intensidade média de 3,2 (escala de 0 a 5), sendo mais prevalente na região Sudeste. Na região Sul, as capitais apresentaram prevalências mais altas em relação ao interior, confrontadas com capitais de outras regiões brasileiras. Em relação à intensidade de dor, as maiores médias foram encontradas nas regiões Sudeste (3,5) e Centro-Oeste (3,6). A maior procura por consultas odontológicas concentrou-se no Sudeste (100%). As capitais do Norte e Sul tiveram a menor demanda. Em relação ao uso de serviços públicos odontológicos, a maior prevalência ocorreu nas regiões Norte e Nordeste. Para situação socioeconômica e dor dentária, todas as regiões apresentaram uma associação entre dor, renda e tipo de serviço. Aqueles com maior dor tinham menor renda e utilizavam mais o serviço público. A função mais afetada pela dor foi a alimentação (chegando a 72% em São Paulo). Fica clara a heterogeneidade entre as macrorregiões brasileiras, mostrando suas desigualdades em relação à saúde bucal.

Os determinantes sociais para o uso do serviço público odontológico por adultos e as inequidades envolvidas foram avaliados por Pinto *et al*. (2016), utilizando dados do levantamento epidemiológico SB Minas Gerais 2012. Baixa renda, número aumentado de integrantes em uma mesma casa e grande número de dentes requerendo tratamento foram associados a maior uso de serviços públicos odontológicos em comparação ao serviço privado. Em relação às variáveis de contexto, uma infraestrutura mais pobre do serviço público de saúde associou-se a um menor uso. Em outro estudo, utilizando a mesma base de dados do estado de Minas Gerais, foi observado que a maior prevalência de uso do serviço público odontológico por adultos foi associada à cor da pele negra, número de habitantes por domicilio (mais de quatro residentes), baixa renda, residência em pequenas cidades (3 vezes maior do que na capital) e maior número de dentes necessitando tratamento (PINTO *et al*., 2014).

Pode-se afirmar que, de maneira geral, a dor dentária está relacionada a baixos índices socioeconômicos (VARGAS; MACEK; MARCUS, 2000; BASTOS;

GIGANTE; PERES, 2008; MACFARLANE; BEASLEY; MACFARLANE, 2014; PINTO *et al*, 2014; PINTO *et al*., 2016), assim como a níveis maiores de comprometimento da saúde bucal (PINTO *et al*, 2014; PINTO *et al*., 2016). Este fenômeno poderia ser explicado, a princípio, pela alta prevalência de doenças bucais entre os mais pobres (WAMALA; MERLO; BOSTRÖM, 2006; MACFARLANE; BEASLEY; MACFARLANE, 2014) e também pelo atraso na procura do serviço odontológico e descrença no próprio processo de tratamento (NGILISHO; MOSHA; POULSEN, 1994; VARGAS; MACEK; MARCUS, 2000). O custo do serviço parece ser outro importante fator que impede a procura dos mais pobres pelo atendimento (MUIRHEAD *et al*., 2009). Alguns estudos têm encontrado maior prevalência de dor de dente em meninas e mulheres jovens (JAMIESON; ROBERTS-THOMSON; SAYERS, 2010; CONSTANTE *et al*., 2012; MACFARLANE; BEASLEY; MACFARLANE, 2014). Ao contrário, Peres *et al*. (2012) relataram maior prevalência entre homens brasileiros. A percepção de dor parece diferir pelo lugar de residência (maior no meio urbano quando comparado ao meio rural), grau de desenvolvimento social (menor relato de dor em regiões com maior Índice de Desenvolvimento Humano– IDH) e pela frequência de escovação (maior percepção de dor em casos de menor frequência de escovação) (HONKALA *et al*., 2001; PERES *et al*., 2010). Registram-se também como variáveis associadas o tabagismo, o consumo de álcool, hábitos alimentares não saudáveis e a presença de cárie dentária (BASTOS; GIGANTE; PERES, 2008; JAMIESON; ROBERTS-THOMSON, 2010; MACFARLANE; BEASLEY; MACFARLANE, 2014). Embora a diferença de prevalência da dor dentária entre raças não seja muito abordada, esta parece ser maior entre os negros (CONSTANTE *et al*., 2012; KUHNEN *et al*., 2009).

A dor em geral e a dor dentária em particular apresentam uma elevada prevalência e morbidade associadas, com um impacto negativo na vida profissional, social e psicológica do indivíduo. Compreender as características sociais, demográficas e econômicas associadas à dor dentária leva a uma maior efetividade na implementação de políticas públicas preventivas e/ou curativas, pela maior racionalidade no planejamento e maior economia de recursos. O presente estudo intencionou um aprimoramento e contribuição ao tema, avaliando por meio de uma análise multinível com fatores individuais e municipais (contextuais) associados à dor dentária na população adulta de Minas Gerais por dados secundários do levantamento epidemiológico SB Minas Gerais (MINAS GERAIS, 2013). Os

Resultados, Discussão e Conclusão desta parte do trabalho serão apresentados na forma de um artigo científico que será submetido ao periódico *Brazilian Oral Research* (Qualis A2), disponível como primeiro item da seção “ARTIGOS”.

1.2 Produto técnico

1.2.1 Revisão translacional

O produto técnico proposto consistiu-se da elaboração e publicação em revista científica de nível internacional de dois artigos científicos de revisão de literatura do tipo translacional, que tem como finalidade a transferência de conhecimentos oriundos da pesquisa básica, na forma mais compacta e acessível possível para a área clínica dentro de seus interesses quanto a diagnóstico, prevenção e tratamento. Os temas contemplados foram: evidências quanto ao tratamento do Bruxismo do sono, e o planejamento protético em pacientes com DTM (muscular ou articular) e/ou bruxismo – ambas revisões visaram os níveis de atenção primária e secundária do setor público de saúde bucal.

Historicamente, a pesquisa translacional esteve de início associada a pesquisas realizadas no Instituto Nacional de Câncer dos Estados Unidos (NCI) e apenas nas primeiras décadas deste milênio foi dirigida a outros campos de pesquisa em saúde (GUIMARAES, 2013). A ideia original de translação do conhecimento surgiu na área de linguística e comunicação e a partir da década de 1970 começou a ser aplicada e discutida também na área da saúde. Refere-se ao método de intercâmbio do conhecimento para sua aplicação por terceiros (DAVISON, 2009; DONNELLY, 2014). Pela definição da Organização Mundial de Saúde (OMS), o pensamento translacional “é um paradigma emergente para o aprendizado [a Compreensão] e o agir em prol do preenchimento das lacunas [entre o conhecimento produzido e utilizado]. Enquanto conhecimento é maior que evidências de pesquisa, a translação do conhecimento pode incrementar o poder da evidência científica e a liderança para informar [fundamentar] e transformar políticas e práticas” (WHO, 2006, p. 1).

Por sua vez DAVISON (2009) compila quatro características importantes sobre translação do conhecimento frequentemente mencionadas por outros autores:

a) ela é multidimensional;

b) envolve interação entre os diferentes atores com a identificação do público-alvo e do contexto onde estão inseridos;

c) a mensagem frequentemente vem do pesquisador, do seu trabalho e do conhecimento sobre os processos e os produtos da pesquisa e:

d) existem facilitadores e barreiras para que a translação do conhecimento ocorra.

A translação em saúde incentiva assim um intercâmbio entre a evidência produzida pelo processo científico tradicional e as reais aspirações sociais e políticas, consonantes com sua época, aproximando a academia do “mundo real”, integrando suas próprias subdivisões e provendo inovação e transformação de fato para a sociedade, por uma via virtuosa de *feedback* conectada a processos governamentais, legais, culturais, industriais e comerciais que fazem inevitavelmente parte de nosso contexto. (KUHN, 2010; FLECK, 2010; CLAVIER et al. 2011; GUIMARAES, 2013).

1.2.2 Disfunções Temporomandibulares / Bruxismo

A DTM é reconhecida como uma condição de dor ou disfunção musculoesquelética que atinge a face em suas estruturas mastigatórias e engloba um grupo de alterações que envolvem as articulações temporomandibulares, os músculos mastigatórios e os tecidos associados (GREENE, 2010). Ela é registrada como a maior causa de dor não dentária na região orofacial (LeRESCHE, 1997) e também a dor crônica mais prevalente nesta região (MANFREDINI *et al*., 2011; PROGIANTE *et al*., 2015). Estudos epidemiológicos sugerem uma prevalência na faixa de 5-12%, sendo mais frequentes em adultos jovens e mulheres (POW, 2001; MACFARLANE *et al*., 2002; JOHANSON *et al*., 2003). Assim como as dores crônicas em geral, a DTM é definida mundialmente como um problema de saúde pública (CROFT; M. BLYTH; Van der WINDT, 2010). Por isso, faz-se importante o estudo de sua etiologia, suas formas de tratamento e a melhor abordagem clínica para pacientes acometidos.

A DTM é classificada basicamente dentro de duas categorias, a partir de seus sinais e sintomas mais comuns: DTM articulare e DTM muscular (SCHIFFMAN *et al*., 2014). O sintoma mais comumente apresentado é a dor localizada nos

músculos da mastigação e/ou área pré-auricular. A mastigação ou outra atividade mandibular geralmente agrava esta dor e os pacientes frequentemente apresentam limitação de movimentos mandibulares e sons articulares relacionados ao movimento (DE LEEUW; KLASSER, 2013).

Por sua vez o bruxismo, recentemente definido como: “atividade muscular mastigatória repetitiva caracterizada pelo apertamento ou o ranger de dentes e/ou ainda tensionar ou movimentar a própria mandíbula” (LOBBEZOO *et al*, 2013; MANFREDINI *et al*, 2016; MANFREDINI; POGGIO, 2017) pode ou não estar relacionado à DTM, sendo considerado motivo de preocupação clínica apenas se em atividade e caso relacionado a claros sinais e sintomas (MANFREDINI *et al*., 2015; JOKUBAUSKAS *et al*., 2017).

Pesquisas baseadas em relatórios de questionários estimam a prevalência do bruxismo do sono entre 14% e 20% durante a infância, decrescendo para 8% a 12% na adolescência e para 3% a 5% acima de 50 anos de idade (KATO *et al*., 2012; MANFREDINI *et al*., 2013a, MANFERDINI *et al*., 2013b). Pesquisas recentes questionam o bruxismo como único ou principal fator etiológico da dor muscular mastigatória, havendo registros de total dissociação entre sinais e sintomas de DTM e o grau do bruxismo apresentado, bruxismo este que deve ser entendido dentro de um amplo espectro de fatores fisiológicos, psicológicos, genéticos e sociais (RAPHAEL *et al*., 2012; MANFREDINI *et al*., 2015; MAYER, 2016; MANFREDINI; POGGIO, 2017). Ainda há amplo debate em relação à qualidade da metodologia empregada nos ensaios clínicos disponíveis, instrumentos de aferição, conveniência e padronização de um valor único como ponto de corte para o diagnóstico do bruxismo do sono (MANFREDINI *et al*., 2016; JIMÉNEZ *et al*., 2017; CASETT *et al*., 2017). O próprio entendimento do bruxismo como patologia tem sido debatido, podendo ele representar até mesmo um fenômeno fisiológico (MANFREDINI *et al*., 2016; RAPHAEL; SANTIAGO; LOBEZOO, 2016, MANFREDINI; POGGIO, 2017).

Ambos, DTM e bruxismo, têm sido erroneamente associados a causas oclusais, além de serem pouco compreendidos pelo dentista clínico, que tende a aglutiná-los em um mesmo conceito ou atribuir indiscriminadamente relação de causalidade. A complexidade dos dois temas torna-os bons candidatos a textos que tenham intenção primordial a comunicação direta com este profissional da atenção básica, que rotineiramente encontra-se diante do desafio de prover uma abordagem atual, ética e eficiente para pacientes portadores destas condições. Assim, o produto

técnico proposto constuiu-se da elaboração de duas revisões críticas translacionais publicadas no periódico *Journal of Evidence-Based Dental Practice* (Qualis B1) (Anexos A e B), visando ao esclarecimento do tema DTM/ Bruxismo para o dentista clínico à luz das evidências e consensos mais atuais.

2 OBJETIVOS

2.1 Objetivo geral

Avaliar os fatores associados à dor dentária na população adulta de Minas Gerais (Brasil) e elaborar material de nível científico em linguagem acessível para o dentista clínico geral sobre os tópicos clínicos relevantes na área de bruxismo e disfunção temporomandibular.

2.2 Objetivos específicos

a) Analisar a associação entre dor dentária e fatores sócio-demográficos como domínio (capital, interior I e II, estado); sexo; cor da pele ou raça; renda familiar;

b) Analisar a associação entre dor de origem dentária e indicadores de saúde bucal como: histórico de cárie de raiz; necessidade de tratamento dentário geral e condição periodontal;

c) Analisar a associação entre dor de dente e acesso aos serviços odontológicos, (tempo decorrido desde a última consulta);

d) Analisar a associação entre dor dentária e as variáveis de contexto municipal, como IDH, taxa de analfabetismo, taxa de desemprego, taxa de renda de até metade do salário mínimo da época, taxa de renda de até um quarto do salário mínimo da época, cobertura das equipes de saúde bucal, acesso ao cuidado dentário individual, média de escovação supervisionada.

e) Elaboração de artigos de revisão translacionais sobre os temas bruxismo, disfunção temporomandibular e planejamento prótetico, e suas publicações em revista científica de nível internacional.

3 METODOLOGIA

3.1 Amostra

O estudo observacional transversal utilizou dados secundários do levantamento epidemiológico SB Minas Gerais, realizado em 2012 (MINAS GERAIS, 2013). O SB Minas Gerais é uma pesquisa por amostra representativa do Estado de Minas Gerais. A população em estudo no presente trabalho foi composta por indivíduos adultos na faixa etária de 35 a 44 anos. Como variável dependente estabeleceu-se a dor de dente nos últimos 6 meses, avaliada pela questão: “Você teve dor de dente nos últimos seis meses”? (sim / não, não se aplica – se o indivíduo avaliado não tem nenhum dente há pelo menos seis meses, não sabe ou não respondeu). Para as covariáveis, os dados foram hierarquicamente estruturados em dois níveis: individual (nível 1) aninhados ao nível municipal (contextual) (nível 2). As variáveis individuais e municipais são descritas no Quadro 1 e Quadro 2, respectivamente:

A variável “domínio” foi dividida em três categorias: capital do estado, cujos dados foram coletados durante o SB Brasil 2010, e dois agrupamentos de municípios do interior (I e II), estabelecidos por um processo de amostragem probabilística por conglomerados, considerando-se os grupos etários e os fatores de alocação do município. Para a definição dos domínios de interior foi utilizado o fator de alocação para o Estado de Minas Gerais construído com base na associação dos índices de necessidade em saúde e índices de porte econômico - estes últimos se basearam no valor per capita do ICMS municipal (Imposto sobre Circulação de Mercadorias e Serviços) (MACHADO, 2003; MINAS GERAIS, 2004). Os municípios foram aglutinados em 4 grupos, ficando no Grupo 1 aqueles que tinham menor necessidade relativa de recursos financeiros para custeio dos serviços de saúde, enquanto os do Grupo 4 apresentaram maior necessidade. No presente trabalho, o “interior I” abrangeu os Grupos 1 e 2, enquanto que o “interior II” abrangeu os Grupos 3 e 4. Estipulou-se então 3 domínios: capital, grupos I e II.

Quadro 1: Lista de covariáveis individuais utilizadas no estudo

Covariáveis	Descrição
Sócio-demográficas	
Sexo	Masculino / Feminino
Cor da pele ou Raça	Branca, Nâo Branca (preta, amarela, parda, indígena)
Renda familiar (em real/mês)	Até 1500 (até 250; de 251 a 500; de 501 a 1500); acima de 1500 (de 1501 a 2500; de 2501 a 4500; de 4501 a 9500; mais de 9500)
Domínios	Capital, interior I, interior II
Agravos Bucais	
Cárie de raiz	Sem histórico (raiz hígida), com histórico (cariada, obturada/cariada, apoio de ponte/coroa)
Necessidade de tratamento de cárie dentária	Sem necessidade e com necessidade (expressos em médias e percentuais; de forma geral, acompanham o perfil do CPO-D, principalmente com relação à proporção dos componentes avaliados).
Condição periodontal	Índice IPC (codificado em sangramento, cálculo e bolsa) e exame da Perda de Inserção Periodontal (PIP). Higido, Sangramento/Cálculo, Bolsa Rasa/Profunda, Menos de 2 dentes funcionais em ao menos um sextante avaliado.
Utilização de serviços (local de atendimento e uso de serviços odontológicos)	
Uso de serviços odontológicos	Consulta ao dentista, nunca consultou, já consultou. Tempo desde a última consulta (mais de 1 ano, menos de 1 ano),

Fonte: Minas Gerais (2013)

Quadro 2: Lista de covariáveis municipais utilizadas no estudo

Covariáveis	Descrição
IDH	Índice de Desenvolvimento Humano
Analfabetismo	Porcentagem (%) de indivíduos de 15 anos de idade ou mais que não sabem ler ou escrever ao menos uma única nota, nenhuma proficiência linguística, para o total da população residente, na faixa mínima de idade, em espaço geográfico, no ano considerado
Desemprego	Porcentagem (%) de indivíduos residentes economicamente ativos, de 16 anos ou mais, desempregados na semana de referência, em um espaço geográfico, no ano considerado
Metade do salário mínimo	Porcentagem (%) de indivíduos residentes com rendimento per capita mensal de até metade do salário mínimo, em um espaço geográfico, no ano considerado
Um quarto do salário mínimo	Porcentagem (%) de indivíduos residentes com rendimento per capita mensal de até um quarto do salário mínimo, em um espaço geográfico, no ano considerado
Cobertura das equipes de saúde bucal	Porcentagem (%) da população coberta pelas equipes de saúde bucal no "programa de saúde da família"
Acesso ao cuidado dentário individual (cobertura de 1° consulta)	Proporção de residentes que receberam uma consulta odontológica inicial agendada com o objetivo de diagnóstico e elaboração de um plano de tratamento preventivo/ terapêutico para abordagem das necessidades detectadas, calculada como porcentagem da população
Média de escovação supervisionada	Número de presentes às ações coletivas para escovação inspecionada, realizadas em um certo local, dividido pelo tempo. A partir de então o resultado é dividido pela população local no mesmo período. Mede a qualidade do serviço em relação ao caráter preventivo.

Fonte: UNPD; IBGE; DATASUS (2018)

Além dos índices tradicionais para aferição dos agravos bucais, foi aplicado um questionário domiciliar aos indivíduos examinados. Utilizou-se o *Personal Digital Assistant* (PDA), dispositivo digital para coleta de dados em domicílio) contendo questões relativas à caracterização socioeconômica, à utilização de serviços odontológicos, morbidade bucal autorreferida e autopercepção de saúde bucal. Os exames bucais foram feitos por equipes de campo, compostas por um examinador cirurgião-dentista e um anotador, prefencialmente um auxiliar em saúde bucal (ASB). Em situações excepcionais, em que este profissional não estivesse disponível, pôde então ser utilizado outro profissional de nível elementar e médio dos serviços de saúde (como agentes comunitários de saúde, por exemplo).

O espelho bucal plano e a sonda para exame epidemiológico bucal (sonda OMS) foram utilizados, sob luz natural e com o examinador e a pessoa examinada sentados, preferencialmente em local bem iluminado e ventilado. A calibração deu-se pelo processo “in lux” (por slides) utilizado com bastante sucesso para agravos clínicos no SB Brasil 2010, em blocos de 5 participantes ao máximo. Nos casos em que o exame não foi somente visual, como para a doença periodontal avaliada pelos “Índice Periodontal Comunitário (IPC) e Perda de Inserção Periodontal (PIP),” realizou-se uma discussão exaustiva dos códigos e critérios dos índices. Foi estabelecido um limite de concordância mínimo de 0,65 para o valor Kappa ponderado. Os índices odontológicos foram utilizados segundo os códigos e critérios recomendados pela Organização Mundial da Saúde (WHO, 1997).

3.2 Análise dos dados

Os dados foram analisados no programa IBM SPSS Software versão 22.0 e HTM 6.08. Inicialmente foi realizada uma análise descritiva dos dados. Modelos de regressão logística bivariada e multivariada foram desenvolvidos, com a estimação dos *Odds Ratio* (OR) brutos e ajustados, e com os respectivos Intervalos de Confiança 95%, considerando o delineamento amostral complexo. Toda a estratégia de construção de modelos seguiu Hosmer *et al*. (2013). O modelo nulo (analizado pelo teste Qui-quadrado) acusou diferença quanto a dor dentária entre as cidades avaliadas ($p<0,001$).

Análises bivariadas aplicaram uma significância de 5% e o modelo ajustado, de 25%. Foram utilizados os programas Statistical Package for the Social

Sciences (SPSS for Windows, version 22.0, SPSS Inc., Chicago, IL, USA) and Hierarchical Linear and Nonlinear Modeling (HLM 6.08 statistical package) (SNIDJERS; BOSKER, 2012). Após uma análise descritiva baseada no *design* de amostragem complexa do SB Minas, uma análise multinível com os dados individuais (nível 1) e municipais (nível 2) dos 57 municípios participantes dentre os 61 planejados foi realizada - inicialmente 30 para o interior I, 30 para o interior II e mais a capital Belo Horizonte. Ao final, três deles não concluíram a coleta no prazo estipulado: Águas Vermelhas, Central de Minas e Santa Fé de Minas - e um, Governador Valadares, teve seus dados perdidos.

As variáveis de nível 1 foram primeiramente incorporadas ao modelo uma por uma, para serem testadas após em conjunto, visando à obtenção do modelo final ($p<0,05$). Em seguida, as variáveis de nível 2 foram incorporadas uma por uma utilizando o teste *t* de student ($p<0,05$). O modelo de análise multinível foi então construído com todas as variáveis individuais que atingiram $p<0,25$. A *Odds Ratio* (OR) e seus respectivos intervalos de confiança de 95% (95% CI) foram estimados para cada análise. A confiabilidade estimada foi usada para se determinar a adequação do modelo multinível final, que incluiu apenas variáveis que alcançaram valores de $p<0,05$.

3.3 Considerações éticas

Toda pesquisa que envolva seres humanos, direta ou indiretamente, incluindo manejo de informações ou materiais, deve atender às exigências éticas e científicas fundamentais de acordo com a Resolução 466/12 (BRASIL, 2012). Não será necessária a anuência de participantes através de um Termo de Consentimento Livre e Esclarecido (TCLE), uma vez que serão analisados dados secundários obtidos através do banco SB Minas Gerais: pesquisa das condições de saúde bucal da população mineira, aprovado pelo Comitê de Ética da Pontifícia Universidade Católica de Minas Gerais no documento n° 9173 de 28 de março de 2012, CAAE: 01107412.40000.5137 (Anexo C). Todas as informações oriundas dos pacientes foram anônimas antes das análises. O banco de dados foi solicitado por meio de um formulário eletrônico da Secretaria de Saúde do Estado de Minas Gerais (SES MG) (Anexo D e E), que autorizou seu acesso (Anexo F).

4 ARTIGOS CIENTÍFICOS

4.1 Artigo 1

A ser submetido ao periódico Brazilian Oral Research (ANEXO G)

FACTORS ASSOCIATED WITH TOOTHACHE IN ADULTS OF MINAS GERAIS / BRAZIL BY A MULTILEVEL ANALYSIS

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Abstract:

The aim of this study was to evaluate the factors associated with toothache in adult population of Minas Gerais state, Brazil. Secondary individual data of an adult population (age 35 to 44) from Minas Gerais / Brazil were extracted from SB Minas database (sex, income, race/skin color, root dental caries, periodontal condition, dental treatment need, last dental appointment), and municipal data were collected from a group of socioeconomic classic municipal indexes (HDI, illiteracy, unemployment, half minimum wage, quarter minimum wage, coverage of oral health

team, access to individual health care, tooth brushing rate). The dependent variable used, from the same database, was toothache at the last six months, assessed by a questionnaire. A Multilevel analysis for both individual and municipal level was accomplished. Statistical analyses used Statistical Package for the Social Sciences (SPSS v. 22.0) and Hierarchical Linear and Nonlinear Modeling (HLM 6.08 statistical package). The statistical model was used to infer association between the different levels. Nearly one-fifth of the sample reported tootache in the last 6 months. There was association between toothache and low income, root caries, periodontal condition, treatment need ($p<0.05$). The increase in a single point percentage in rate of quarter minimum wage income augmented 3% the risk for toothache in adults of Minas Gerais (1.03 OR; 95% CI; 1.00-1.08). Socio demographic and socioeconomic factors were associated to toothache for the assessed population, which reinforces the need to address these factors in order to provide efficient community prevention planning schemes.

Descriptors: Toothache, Adults, Social Determinants of Health, Epidemiologic Factors.

Introduction

Toothache is described as a pain covering teeth or surrounding tissues. It is feeling as constant or intermittent pain, do not cease easily and is the most prevalent acute pain in orofacial region. Acute pain, unlike chronic pain, has inception mechanism and neurophysiological intimacy with biological damage or chemical/mechanical threat.[1] Naturally and hence, toothache in adults has been connected with report of oral biological conditions as mouth ulcers, painful gums, bleeding gums, loose teeth and tooth loss,[2] a portray of poor preventive action or untreated diseases as tooth decay or periodontitis.[3-5] Additionally, an early historical of pain in teeth may even prevent adults from seeking a proper dental care service afterward, by pain fear.[6,7]

As depicted in epidemiological surveys that encompass toothache in their methodology, accomplished in distinct countries around world as China,[8] Australia,[9] South Africa,[10] Iran[11] and United Kingdom,[2,4] toothache is worldwide associated with high morbidity, elevated psychological impact and sleep impairment.[8,9,11-13] The experience of pain originated in teeth in adults may generates great grief and social impact as financial losses, at individual or community level, by loss of working hours and hence a decreased productivity.[2,4,10,14,15] Otherwise, toothache seems to be fostered by associated factors like low socioeconomic status, low income and poor access to health services.[16-18]

In Brazilian context, studies were undertaken to access social determinants of health and social inequalities concerning individual prevalence and intensity of toothache (by a numeric scale). Hafner et al.[12] assessed prevalence of toothache inter-region from Brazilian territory, as well between capitals and inner cities. The total prevalence was 21% of population. Pain was associated with major use of public services and lower income. By the way, Social Determinants of Health were assessed regarding the use of public dental services by Pinto et al.[17] from SB Minas Gerais (2013)[3] database. Low income, augmented household, higher number of teeth requiring treatment were associated to greater use in public services in comparison with private services. Among context variables, a poor sanitary infrastructure was associated to use of the same public services. In another study from the same database, a greater public health service use was associated to colored skin, low income and living in small cities (3 fold up than in capital).[18] Historically, the socioeconomic weight in health services access is broadly considered.[18,19]

Similarly, worldwide toothache is correlated with low socioeconomic status,[4,8-12,16,17,20,21] intense oral health deterioration,[2] and systemic or mental disease as well.[2,4,13] It could be explained, at first sight, by higher oral disease prevalence in poor people,[2,22] also by delay in search for dental services or disbelief in health system.[8,10,22] Costs may be another factor to preclude the search for services by poor people.[8,21,23] As associated factors, tobacco, alcohol consumption level, unhealthy food habits, and decay are frequently cited.[2,21,23] One study cited low dental hygiene habit.[11] Although oral pain prevalence among races are not so widely assessed, it might be stronger in colored people.[13,14,20]

A better analysis of socio demographic and economic data related to dental pain could lead to a novel approach in public health administration, providing efficacy and economy by rationalization upon use of public resources. The objective of the current work was to evaluate the factors associated with toothache in an adult population of Minas Gerais / Brazil.

Methods

In 2012, cross-sectional population-based survey was carried out to evaluate oral health conditions of the population of Minas Gerais state, Brazil, by questionnaire and clinical exam. Study was named SB Minas Gerais.[3] This work was a partnership between the Minas Gerais Department of Health and Pontifícia Universidade Católica of Minas Gerais (PUC Minas), which is a Collaborating Center for Oral Health Surveillance of the Brazilian Ministry of Health.

To date, Minas Gerais is the 4th Brazil national state in area, 2th in population size (19.597.330 inhabitant in 2018) and 3th wealthier by Gross Domestic Product (GDP) index (IBGE, 2018),[24] encompassing 853 cities (AMM, 2018).[25] Minas Gerais rank 0.731 Human Development Index (HDI), the 9th out of total 27 states in Brazil, has the 10th place in monthly household income per capita, 2nd in number of enrollments in elementary education (behind São Paulo State) and 8th in 16 age or over in active formal employment, at reference week.[24] The SB Minas Gerais study was approved by the Ethics Committee of PUC Minas (CAAE 01107412.4.0000.5137).

Cities assessed in SB Minas (originally 60 cities plus the capital) were grouped in three broad “dominion”: Capital, Group I and Group II. The last two were based in four Minas Gerais official allocation factor for health vulnerabilities and economic status, these ones used as distribution standard for health revenue to the distinct cities, from the minimum need to the maximum need.[26,27] Thereof, Group I cluster the more autonomous/less vulnerable cities, whether Group II join less autonomous/more vulnerable ones. At first, thirty cities composed each group - sixty in total - chosen by careful randomization methods. Eventually, a total number (including all age range) of 4,898 households and 4,840 inhabitants were assessed.[3]

Oral clinical exams were accomplished by trained and calibrated teams, each composed by one dentist and one note writer (calibration by “in lux” process). A set of clinical mirror and clinical probe (World Health Organization probe - WHO) was used for the task in a well suited and lit environment. Inter rater reliability (Cohen`s Kappa) was stated in a minimum of 0.65 for an examiner embodies the team. Dental index was along with WHO recommendations.[28] Apart from classical oral health index (i.e.: DMFT – decayed, missing, filled index, CPI – community periodontal index) domiciliary questionnaires were applied by the same calibrated team (at first coming from formal and experienced municipal staff) all over 2012. Questions covered socio demographic, socioeconomic status, dental service use and dental treatment need.

For this study, data of an adult population, aged from 35 to 44 years (n=1,207) were extracted of SB Minas database. The dependent variable was toothache prevalence assessed by the question: “Have you felt toothache over the last six months?” (No, yes, not applicable - if edentulous over the last six months - don`t know or don`t answer). For independent variables, data was hierarchically structured in two levels: individual variables (Level 1) nested with municipal variables (Level 2). Variables sex, income, race/skin color, root dental caries, periodontal condition, dental treatment need, last dental appointment included in Level 1 were extracted from database SB Minas, 2012. Variables included in Level 2 were Human Development Index (HDI)[29] extracted from United Nations Development Program (UNDP) - Brazil section;[30] illiteracy, unemployment, half minimum wage, quarter minimum wage extracted from Brazilian Institute of Geography and Statistics;[24] Oral Health Team coverage, access to individual dental care (entrance in the scheduled treatment program) and supervisioned tooth brushing average, extracted from Brazilian Unified Health System Database [DATASUS].[31] The description of each independent variable at Levels 1 and 2 are described in Figure 1.

Figure 1 - Description of each independent variables according to the level of analysis. SB Minas Gerais. Brazil, 2012.

Level	Variable	Description
Level 1 - Individual	Sex	Male - Female

	Income	Up to R$1500 brazilian reais* – More than R$1500
	Race/Skin Color	Self-reported skin color. From the five original categories, a dichotomous variable was created (white and non-white).
	Dominion	Capital, Group I, Group II
	Root dental caries	Dichotomous: Presence – Absence
	Periodontal condition	Absence of disease; Gingivitis/Dental calculus; Probing depth longer than 3 mm; Less than two functional teeth in at least one sextant assessed
	Dental treatment need	Dichotomous: no need (healthy crown and root) need (one surface restoration need; two or more surfaces restoration need; prosthetic crown by any reason need; esthetic facet need; pulp treatment and restoration need; tooth extraction need; active white stain treatment need; sealant need)
	Last dental appointment	Less than 1 year More than 1 year Never use
Level 2 - Municipal	HDI	Human Development Index
	Illiteracy	Percentage (%) of people who cannot read and write at least one single note, no language proficiency, for the total resident population in the minimum age range, in a geographic space, inside the considered year
	Unemployment	Percentage (%) of resident people

		economically active, unemployed at reference week, in a geographic space, within the considered year
	Half minimum wage	Percentage (%) of resident people with per capita month domicile revenue up to half minimum wage, in a geographic space, within the considered year
	Quarter minimum wage	Percentage (%) of resident people with per capita month domicile revenue up to a quarter minimum wage, in a geographic space, within the considered year
	Oral Health Team Coverage	Percentage (%) of population covered by Oral Health Teams
	Access to individual dental care (entrance in the scheduled treatment program)	Percentage (%) of residents who receive a scheduled primary dental consultation with the aim of diagnosing and elaborating a preventive/therapeutic plan to address the detected needs, calculated as a percentage of the population
	Supervisioned tooth brushing average	Percentage (%) of inspected brushing collective actions

* USD 1 = 2 brazilian reais (Jul 2012)

Statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS for Windows, version 22.0, SPSS Inc., Chicago, IL, USA) and Hierarchical Linear and Nonlinear Modeling (HLM 6.08 statistical package).[32] Multilevel analyses were used to assess the association of municipal and individual variables with absence or presence of toothache in the last 6 months.

At first one descriptive analysis was made using the Complex Samples module that considers the complex sampling design of SB Minas Ferais. The multilevel structure of analyses included 1,121 individuals (Level 1) from 57 municipalities (Level 2) and was carried out through nonlinear logit link function

analyses which used the scheme of fixed effects/random intercept. Parameters were estimated using the restricted maximum likelihood method predictive quasi-likelihood (PQL). A multilevel logistic regression model was built. In the first stage a “null model” estimated the basic partition of data variability between the two levels before the inclusion of individual and municipal characteristics were taken into account.

The Level 1 variables were initially incorporated into the model one by one, before being tested together ($p < 0.05$). Henceforth was applied the test for municipal variables (Level 2), which were incorporated one by one, using Student’s *t*-test ($p < 0.05$). The model of multilevel analyses was constructed with all single variable achieving $p < 0.25$. Odds Ratio (OR) and their respective 95% confidence intervals (95% CI) were estimated in each analysis. The reliability estimate was used to determine the adequacy of the final multilevel model. The final model included only variables with p-value <0.05.

Results

Table 1 summarizes sample distribution about individual variables. For the dependent variable, 21.1% answered yes to toothache in the last 6 months, and 78.9% answered negatively. Most of participants was female (61.5%), non-white (55.5%) and had income up to R$1,500 (54.6%). In relation to oral health, most presented no root dental caries (83.3%), presented gingivitis/dental calculus (31.6%), needed dental treatment (51.4%), and had the last appointment up than 1 year (49.2%).

Table 1. Descriptive analysis of individual variables, from adults (n=1,207), Minas Gerais, Brazil, 2012.

Variables[*]	**N**	**% (CI 95%)**[†]
Dependent variable		
Toothache in last 6 months		
No	931	78.9 (74.7-82.5)

Yes	272	21.1 (17.5-25.3)
Independent individual variables		
Sex		
Male	431	34.9 (31.4-38.5)
Female	776	65.1 (61.5-68.6)
Income		
Up to R$ 1500	750	54.6 (48.3-60.8)
More than R$ 1500	438	45.4 (39.2-51.7)
Ethnic group		
White	482	44.5 (40.4-48.6)
No white	725	55.5 (51.4-59.6)
Root dental caries		
No	996	83.3 (79.9- 86.3)
Yes	211	16.7 (13.7-20.1)
Periodontal condition		
Absence of disease	305	23.9 (20.4-27.8)
Gingivitis/Dental calculus	364	31.6 (27.6-35.9)
Probing depth longer than 3 mm	173	15.8 (12.3-19.9)
Less than 2 teeth	338	28.8 (24.6-33.3)
Dental treatment need		
No need	586	48.6 (44.4-52.8)
Need	621	51.4 (47.2-55.6)
Last dental appointment		
Less than 1 year	526	45.4 (41.0-49.8)
More than 1 year	575	49.2 (44.7-53.8)
Never use	101	5.4 (3.0-9.6)

*There are missing values for some variables; †sample design taken in account

The null model (analyzed by Chi-square test) indicates that there was a difference in toothache among 57 cities assessed in this study (p<0.001). From the early 61 cities (30 group I, 30 group II, 1 capital), 3 withdraw from the original project and one had their data lost (Governador Valadares), hence has been excluded from final multilevel analysis. (Table 2).

Table 2. Final estimation of variance components in the multilevel analysis ("null-model")

Random Effect	Standard Deviation	Variance component	df	Chi-square	P-value
Intercept, U0	0.97024	0.94137	55	194.49	<0.001

Table 3. Multilevel models (unadjusted and adjusted) for variables of individual (n=1,121) and municipal levels associated with toothache in adults. Minas Gerais, Brazil, 2012

Models	**Unadjusted OR***	**95%CI**	**p**	**Reliability estimate**	**Adjusted OR***	**95% CI**	**p**	**Reliability estimate**
Individual-level variables								0.700
Sex								
Male	1							
Female	1.07	0.72-1.58	0.737	0.663				
Income								
≤ R$1,500	1				1			
> R$1,500	0.36	0.24-0.55	<0.001	0.671	0.50	0.32-0.76	0.002	
Race / Skin color								
White	1							

Non-white	1.48	0.99-2.22	0.059	0.664			
Root dental caries							
No	1				1		
Yes	2.43	1.55-3.80	<0.001	0.665	1.86	1.22-2.86	0.005
Periodontal condition							
Absence of disease	1			0.674	1		
Gingivitis/Dental calculus	1.61	0.98-2.67	0.060		1.31	0.80-2.15	0.277
Probing depth >3 mm	2.92	1.56-5.45	0.001		2.05	1.13-3.69	0.018
≤ 2 teeth	3.35	1.97-5.67	<0.001		2.15	1.27-3.64	0.005
Dental treatment need							
No need	1				1		
Need	2.66	1.90-3.72	<0.001	0.671	6.74	3.40-13.37	<0.001
Last dental appointment							
≤1 year	1			0.664			
>1 year	1.51	1.06-2.17	0.024				
Never use	1.35	0.58-2.17	0.486				
Municipal-level variables							
HDI	0.26	0.001-176.67	0.683	0.668			
Illiteracy	1.04	0.99-1.09	0.113	0.663			
Unemployment	1.05	0.92-1.89	0.486	0.665			
Half minimum wage	1.01	0.99-1.03	0.199	0.666			
Quarter minimum wage	1.03	1.00- 1.06	0.058	0.662	1.03	1.00-1.08	0.043
Coverage of Oral Health Team	1.01	0.99-1.02	0.315	0.664			
Access to individual dental care	0.98	0.93-1.02	0.385	0.660			
Tooth brushing rate	1.00	0.88-1.13	0.939	0.668			

*OR=Odds Ratio

The final adjusted multilevel analysis (n = 1,121) indicated that adults receiving more than 1,500 Brazilian reais / month presented less risk to toothache compared to those receiving less than 1,500 Brazilian reais. Their higher income level posed a protective factor (OR=0.50; 95%CI=0.32-0.76). The presence of root caries increased the chance of toothache (OR=1.86; 95%CI=1.22-2.86). Likewise, adults with gingivitis/dental calculus (OR=1.31; 95%CI=0.80-2.15), probing depth up than 3 mm (OR=2.05; 95%CI=1.13-3.69) and “less than 2 functional teeth” (OR=2.15; 95%CI=1.27-3.64), showed more toothache risk comparing to those without those periodontal signals. Individuals with dental treatment need had 6.74 (95% CI; 3.40-13.37) more chance for toothache. The increase of one point in rate of individuals who gained up to one quarter of Brazilian minimum wage / month increased in 3% the chance of oral pain in adults (OR=1.03; 95% CI; 1.00-1.08) (Table 3).

There was no interaction between individual income and income at municipal level (quarter minimum wage) (p= 0.948) [data not shown]. In the final model, 22% of the variance in dental pain was explained by contextual variables.

Discussion

Present study assessed a set of secondary data from a representative sample, collected by questionnaire and clinical exam simultaneously with self-related toothache assessed by the query: “have you felt toothache over the last 6 (six) months?”[3] Most of 1,121 individual sample was female, income up to R$1,500 and non-white. Is noteworthy that 21.1% of total population of the study answered “yes” to toothache in the last 6 months (overall one out of five adults inquired), rating higher in comparison with studies from adults in United States (14,5%)[14] and South Africa (19,4%)[10] and matched the percentage from total Brazilian population (21%).[12] After multilevel analysis was accomplished, the association between data from different levels came out and the final model, similar to many other epidemiologic surveys,[2,12,14,15,20] and unlike Kakoei et al.[11] in Iran, found association between toothache and socioeconomic handicap, as familiar income. Income is a social health determinant as it enables the purchase of goods and services that enhance biological or mental health beyond public health array, and may foster wellbeing, social interaction and freedom.[33]

For individuals with dental treatment need, there was a substantial increase in chance for toothache. In contrast, Leung et al,[8] assessing a Chinese population sample for chronic orofacial pain (meaning pain enduring for at least 6 months, toothache included), registered, by questionnaire, an associated most prevalent “low level of perceived need for treatment” (83.7%). This find might be related to bias upon the unique category of “chronicity” above cited applied to toothache and/or higher levels of pain-coping scores for this specific Asian ethnic group. The categorization of a toothache as "chronic" is rather questionable, since it is commonly derived from detectable acute dental conditions, and it varies and changes over time.[1] Santiago et al.[16] reported toothache risk for “Fair/Poor/Very poor” self-perceived oral health (reference: Excellent/Good). This is in consonance with higher oral disease prevalence in poor people cited in literature.[2,15,19] The reason seems to be the classical causes for the rise in toothache, as mentioned: caries, inflammatory conditions, trauma, etc.[1,2,12,15,16]

Sex and race/skin color did not reach association, although by some studies toothache might be stronger in colored people[13,14,23] and other set report Asian ethnic group as referring less orofacial pain or coping better with pain.[2,4,8] Few studies found toothache more prevalent in women than in men.[2,4,8,23]

Presence of root caries increased the chance of toothache. Previously, Santiago et al.[16] found a toothache risk for the reported “number of decayed teeth” As broadly accepted, tooth decay may expose or affect pulp by inflammatory mediators, firing trigeminal pulpal endings and leading to pain threshold decrease.[1]

Our study registered clinical periodontal condition as an associated factor, described as gingivitis/dental calculus, probing depth up than 3 mm and “less than 2 functional teeth in any assessed sextant.” Similarly, earlier epidemiological surveys registered self-reported bleeding gums and loose teeth as in association.[2] On the other hand, toothache impact on daily activities may potentially aggravate general health or even precipitate the same above cited oral diseases, henceforth maintaining or reinforcing pain, in a vicious cycle. This impact was early reported in different ways, as difficulties in chewing certain foods[12], sleep disturbance[12,14] uncomfortable teeth brushing[11] interfering on cleaning teeth and gums.[34]

Upon municipal variables (contextual variables), “quarter minimum wage” reached association without interaction with income at individual level (level 1) above cited. The inherent poverty encountered in people living up to a quarter minimum wage in Brazilian economical context and, in other hand, the better economic condition provided by more than R$1,500 wage at individual level displays the well-known relationship between poverty and low health care condition. As already disclosed, lower income and high social vulnerability is vastly associated with toothache,[2,4,11,14,15,20] and financial cost has frequently cited as a hurdle to access better oral health services.[8,19,21] This lack of interaction between data from distinct levels might have reproduced the fact that, likewise in the original SB Minas Gerais Main Outcome Publication,[3] the above cited city allocation factors did not necessarily match with toothache frequency. Average collective index as those (i.e. average income or average tax collection rates) encompasses a bunch of economic variables that might not exactly mirror the segregated individual economical condition.

The increase of one point in the rate of individuals with living up to one quarter of Brazilian minimum wage / month increased in 3% the chance of oral pain in adults, disclosing clear additional risk for toothache at poor communities, in consonance with literature.[2,10,12-15,23,34]

Time elapsed from last dental appointment (our proxy for access) did not present association at final model, despite been registered association in unadjusted rank - “more than one year” (Table 4). Notwithstanding, Santiago et al.[16] encountered toothache association, in the final multilevel model, with “more than one year from last dental appointment,” in consonance with other studies[14,15,23] Kuhnem et al.[23] pointed the “use of dental services in the past year” as a protective factor for toothache occurrence. Last dental appointment might be biased by use of supportive analgesic medicine and cultural influences about pain, and may yet pose an inverse causality, been a consequence rather than cause for toothache.[16]

Other municipal level variables did not reach enough association level within final model, as following: HDI, coverage of oral health team, access to individual dental care, illiteracy, unemployment, brushing level and half minimum wage living. This lack of association may be accounted for the same complexity of data and method considered above for income.

Notwithstanding the unique and substantive methodological multilevel design and data collected from the large sampled and well-calibrated SB Minas primary study, our work is limited by the cross-sectional profile of analysis of both original database and municipal indexes that do not allow for causal inferences. However, the high level of risk disclosed for periodontal condition and in special for "treatment need" suggests causality, what is in consonance with outstanding clinical aspects upon these individual variables. Additionally, the use of a single questionnaire to collect toothache data for the last six months may partly incorporate misclassification bias or memory bias.

Conclusions

Toothache was associated to some sociodemographic and biological factors as higher income (as protective factor), root dental caries, periodontal condition and treatment need at individual variable level, and up to a quarter of minimum wage living at municipal variable level.

Results shed light on oral inequalities among population from each stratum measured from three socio economical dominium assessed and reinforce need to address those same factors involved with toothache, in order to better accomplish public dental goals and provide fair services on oral healthy in Minas Gerais society, in compliance with literature.

More studies addressing toothache and socioeconomic contextual variables as social determinants of health are needed to increase the knowledge in this field.

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4.2 Artigo 2

Publicado no periódico Journal of Evidence Based Dental Practice (ANEXOS A e H)

ARANHA, R.L.B. et al. Evidence-Based Support for Sleep Bruxism Treatment Other Than Oral Appliances Remains Insufficient. J Evid Based Dent Pract, v. 18, n. 2, p. 159-161, Jun. 2018. ISSN 1532-3390. Disponível em: < https://www.ncbi.nlm.nih.gov/pubmed/29747797 >.

EVIDENCE-BASED SUPPORT FOR SLEEP BRUXISM TREATMENT OTHER THAN ORAL APPLIANCES REMAINS INSUFFICIENT

PURPOSE/QUESTION: To access the best clinical management for the sleep bruxism (SB) in adults.

ARTICLE TITLE AND BIBLIOGRAPHIC INFORMATION:

Management of sleep bruxism in adults: a qualitative systematic literature review. Manfredini D, Ahlberg J, Winocur E, Lobbezoo F. J Oral Rehab 2015; 42:862-74.

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TYPE OF STUDY/DESIGN:

Systematic Review

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KEYWORDS: Sleep bruxism; Treatment outcome; Adult; Systematic Review

SUMMARY

Selection Criteria

This systematic review performed by Manfredini et al. (2015) included peer-reviewed English language papers focused on clinical investigations on humans, assessing the effectiveness of treatment approaches to sleep bruxism (SB), as diagnosed with polysomnography (PSG) or sleep time electromyography (EMG) of the masticatory muscles. This is an update to the SB management review published by Lobbezoo et al. (2008) and focuses on the most recent literature about it. Two

authors reviewed [2] databases (Medline and Scopus). Any disagreements were resolved by discussion to reach consensus. The search retrieved 1494 citations that were screened for eligibility. After applying inclusion and exclusion criteria fourteen paper were included in the review.

Key Study Factor:

The intervention was therapeutic modalities aiming SB decrease in adults, evidence of efficacy and clinical remarks. Oral appliance (OA), pharmacological approaches (i.e. botulinum toxin, clonazepam, clonidine), biofeedback (BF) and cognitive behavioral (CB) composed the final review.

Main Outcomes Measures:

The main outcome of interest is reduction of sleep bruxism by available therapeutic modalities, as bruxism rates been assessed by polysomnography (PSG) with audio-video (AV) recordings, or with any other approach measuring the sleep time masticatory muscle´s activity, viz., PSG without AV recordings or electromyography (EMG) recorded with portable devices, at baseline and after several distinct follow-up periods, ranging from the very few protocol days (i.e. 3–5) in a short-term crossover investigation to up to 3 months in the uncontrolled before–after study.

Main Results:

The systematic review included seven papers report on oral appliances (OA), four papers report on pharmacological management of SB (two of them deal with botulinum toxin, two papers assess the effectiveness of benzodiazepine clonazepam or antihypertensive drug clonidine). Other two studies deal with sleep hygiene and relaxation techniques, and the remaining paper reports an uncontrolled series of ten patients receiving electrical stimuli to the masseter muscles. Results demonstrate that, despite high variability of topics and designs, (i) almost every type of OA is somehow effective to reduce SB activity, with a potentially higher decrease for devices providing large extent of mandibular advancement; (ii) all tested

pharmacological approaches may reduce SB with respect to placebo; (iii) the potential benefit of biofeedback (BF) and cognitive–behavioral (CB) approaches to SB management is not fully supported; and (iv) the only investigation providing an electrical stimulus to the masseter muscle supports its effectiveness to reduce SB.

Conclusions:

Authors conclude that the only treatment modality with enough evidence for bruxism is the use of OA, despite the lack of standardized methodology in available studies and of knowledge about its own mechanism of action. Furthermore, an accurate bruxism diagnostic methodology and consistent protocol for treatment indication is needed. Future studies are recommended.

COMMENTARY AND ANALYSIS

Bruxism is a broad term grouping different motor phenomena. The most updated definition is: “repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible”. It is subdivided in: awake bruxism (occurring during wakefulness) and sleep bruxism (occurring during sleep time). Both have distinct physiologic and therapeutic context.[2]

Despite the all known trend linking clinical features like dental wear, joint pain, muscle pain or even cervical pain to bruxism as a pathology and their main etiologic factor, by current evidences there is now some agreement in consider that bruxism-related motor activities are associated with behavior and not with a disorder.[3-5]

The paper aims to update the bruxism management review published by Loobezoo et al in 2008,[1] which establishes a consensual approach for clinical purpose, considering lack of sound methodological quality, inconclusive outcomes and need for designing higher-quality studies. The review focused on the recent literature of sleep bruxism (SB) in adults, as diagnosed with polysomnography (PSG) with audio-video (AV) recordings, or with any other approach measuring the sleep-time masticatory muscles’ activity, viz. PSG without AV recordings or electromyography (EMG) recorded with portable devices. After stringent methodological criteria applied, fourteen (N = 14) papers were included in this review

(aiming the sleep bruxism) of which 12 were randomized controlled trials (RCTs) and 2 were uncontrolled before–after studies.

The management of bruxism is still fragmental, as suggested by Lobbezoo et al. (2008).[1] The number of high-level evidence-rated papers about SB is still scarce. The studies eligible for this recent review included a wide variety of management strategies, and lack of homogeneity between studies. For the tested pharmacological approaches, results disclosed botulinum toxin, clonazepam and clonidine as lowering SB rates. Interestingly, muscle relaxant drugs (commonly used in clinical TMD treatment) didn`t achieve the same degree of evidence for SB. The two studies investigating botulinum toxin showed reduced intensity of SB episodes, but not its frequency - suggesting the peripheral action of the drug, rather than central effects.[6,7] Given the temporary action and invasive profile, the suitability of botulinum toxin for bruxism clinical approach remains on discussion.

Based on the original articles included in the final analysis, and contradicting some cues in previous studies,[8,9] the benefit of biofeedback (BF) and cognitive–behavioral (CB) for SB management was doubtful. But given the relative safety nature of these approaches, the authors recommended their inclusion in SB protocol to maximize the effects of multimodal approach. One sole paper cited in review (an uncontrolled series of ten patients), aiming the decrease of SB by electrical stimulus to the masseter muscle supported its effectiveness, but without practical or even rational clinical usage up to now. [10]

Eventually the authors conclude on the effectiveness of OA, despite lack of knowledge about its real mechanism of action. The variability in their study design showed that every kind of available device was somehow effective to reduce SB activity, but it is important to remind that the current evidence provides support for only temporary bruxism reduction.[11,12]

Furthermore, it was mentioned that OA designed to offer a high extent of mandible advancement (50–75%) seemed to be yet more effective to reduce SB, what could possibly be explained by some reduction contractile properties of masseter muscles when the mandible is advanced, or alternatively the ceasing of certain amount of SB-like motor phenomena as part of an apnea-induced arousal,[2] reminding that mandibular advancement is referred currently as an option for sleep-apnea approach.[13]

The total results of this study suggest that the current evidence does not support the existence of a standard of reference protocol for SB treatment, with exception of the use of OA (but it is prudent to keep in mind its longer lifetime use in dentistry,[14] hence the greater availability for papers in this restrict field, unlike other modalities examined). Beyond, the authors suggest studies of the triangle bruxism – pain – psychosocial factors can contribute to the understanding of the SB phenomena, besides studies with sound diagnostic methodology and consistent protocol for treatment.

The findings of this study enable the clinicians to understand that the evidence-based recommendations on SB management at the individual level are not available until this moment, except for the use of OA. Furthermore, an accurate bruxism diagnostic methodology and consistent protocol for treatment indication is needed. To date, prudence and low invasive techniques hold the original Lobbezoo et al. (2008)[1] counseling for treatment. In brief, the “triple P”: plates, pep talk, pills, psychology and physiotherapy. Future studies are recommended.

STRENGH OF RECOMMENDATION TAXONOMY (SORT) GRADING

LEVEL OF EVIDENCE: Level 1

STRENGH OF RECOMMENDATION GRADE: A

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4.3 Artigo 3

Publicado no periódico Journal of Evidence Based Dental Practice (ANEXOS B e H)

ARANHA, R. L. B. et al. Current Evidence About Relationships Among Prosthodontic Planning and Temporomandibular Disorders and/or Bruxism. **J Evid Based Dent Pract**, v. 18, n. 3, p. 263-267, Sep. 2018. ISSN 1532-3390. Disponível em: < https://www.ncbi.nlm.nih.gov/pubmed/30077384 >.

CURRENT EVIDENCE ABOUT RELATIONSHIPS AMONG PROSTHODONTIC PLANNING AND TEMPOROMANDIBULAR DISORDERS AND/OR BRUXISM

PURPOSE/QUESTION: To access the current concepts and formulate the best prosthodontic planning for patients with temporomandibular disorders and/or bruxism

ARTICLE TITLE AND BIBLIOGRAPHIC INFORMATION:
Prosthodontic planning in patients with temporomandibular disorders and/or bruxism: A systematic review. **Manfredini D, Poggio CE.** J Prosthet Dent. 2017;117(5):606-13.

REVIEWERS

Ricardo Luiz de Barreto Aranha, Mauro Henrique Nogueira Guimarães de Abreu, Júnia Maria Serra-Negra, Renata Castro Martins

STRENGTH OF RECOMMENDATION GRADE:
Grade B

LEVEL OF EVIDENCE:
Level 2

SOURCE OF FUNDING:
Information not available

TYPE OF STUDY/DESIGN:
Review

KEYWORDS: Temporomandibular disorder, Bruxism, Prosthodontics, Systematic review

SUMMARY

Selection Criteria

Three previous questions lead this review: should prosthodontics be used to treat temporomandibular disorders (TMD) and/or bruxism? Can prosthodontics cause TMDs and/or bruxism? How can prosthodontics be performed (for prosthetic reasons) in patients with TMD and/or bruxism? In the search for the answers to these 3 questions, as a first step, a search in the PubMed database was conducted in 2016 by 2 authors. The goal was to identify all randomized clinical trials (RCT) using the combination of the term “prosthodontics” with either “temporomandibular joint disorders” and/or “bruxism”. As a second step, the search was extended to the full citation lists, related article lists, and author personal collections. The decision about inclusion or exclusion in the review was made by consensus.

Key Study Factor

The inclusion criteria were clinical trials that compare the effectiveness of prosthodontics with that of other treatments in the management of TMD and/or bruxism (for question 1); that report the onset of TMD and/or bruxism after the execution of prosthetic treatments in healthy individuals (for question 2); and that compare the effectiveness of different prosthodontics strategies for the management of vertical dimension of occlusion, the intermaxillary relationship recordings, and the occlusal scheme design in the management of the prosthetic needs in patients with TMD and/or bruxism (for question 3).

Main Outcome Measures

The primary outcomes were TMD signs or symptoms and bruxism level measured by questionnaires, polysomnographic (PSG) or electromyographic (EMG)

devices before and after prosthetic or occlusal treatment, and effectiveness of different prosthodontics strategies in patients with TMDs and/or bruxism.

Main Results:

The first step of the review included only 11 unsatisfactory RCT citations with the term “prosthodontics” AND “temporomandibular joint disorders” and 10 unsatisfactory RCT citations with the terms “prosthodontics” AND “bruxism.” The search was then extended to the full citation lists of the above queries (622 and 350 citations, respectively). At last, none of prospected papers assessed showed a specific study design that fully satisfied the desired clinical scenarios. Notwithstanding, the authors’ discussion was undertaken based on the best available evidence. As main results, authors declare the following:

a) There is no supportive evidence to account for prosthodontics (or whichever invasive therapy) as a treatment option for TMD and/or bruxism (mainly the latter) (question 1).
b) There is no evidence for considering prosthodontics as an etiologic factor for TMD and/or bruxism (mainly the latter). It is advisable avoiding abrupt or massive changes in the natural pattern of occlusion (question 2).
c) Patients with ongoing TMD should be treated for the TMD before starting any prosthetic compromise. Planning restorations or occlusal rehabilitation in patients with bruxism might be done cautiously and only with prosthetic purposes.

Conclusions:

The authors conclude that there is an absence of RCT on the various topics concerning the relationship between TMD and/or bruxism and prosthodontics. By the current available evidence, prosthodontics was not considered to be appropriate treatment for TMD symptoms or bruxism management. Clinicians should be careful when performing a wide range of irreversible occlusal changes in healthy individuals and especially in patients with TMD and/or bruxism.

COMMENTARY AND ANALYSIS

Concepts regarding prosthetic dentistry and TMD or bruxism have changed to a great extent. Studies do not recommend invasive or irreversible occlusal or orthopedic changes in the stomatognathic system to manage or prevent TMD and/or bruxism. [1, 2] However, anatomic or occlusal concepts remain important as baseline information for prosthodontics, orthodontics, and dental procedures in general. TMD is a "heterogeneous group of conditions affecting the temporomandibular joints (TMJ), the jaw muscles, and the related structures" [3] with a multifactorial and multicausal profile for etiological concerns, risk prediction, symptoms improvement, individual prognosis, or treatment outcomes.

Bruxism, now defined as "a repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible," [4] in a similar way was in the past designated as TMD symptoms' major etiologic factor or even the unique factor to relate to TMD. Today, studies have revealed new ideas about this issue, in some sense disconnecting muscular nocturnal hyperactivity registered by PSG or EMG and symptoms of TMD. [5] Bruxism is also not a unique phenomenon, and it is divided into primary or secondary bruxism and sleep or awake bruxism. The development of this split conceptualization may change the expected results in clinical and research scenarios. It must be well addressed in future studies.[6]

Three distinct questions guided the whole review, as disclosed here:

Should prosthodontics be a treatment option for TMD or bruxism?

The available research led the authors to answer this in the negative. Despite the lack best evidence sources, it is taken for granted that, in general terms, neither prosthodontic nor any occlusal commitments can be considered valid therapeutic options for TMD and bruxism (especially the latter). [1, 2, 7, 8, 9]. The conceptual framework that deemed occlusion, orthopedic, or anatomic issues as the main etiological factor or risk factor for bruxism or TMD has been discarded. Results from orthodontic studies have shown no association with either an increase or a decrease in risk for TMD, and even non-ideal or unsuccessful results do not predict a higher onset in TMD cases in future. [7] In addition, as noted in the article reviewed, even if reverse articulation (unilateral posterior crossbite) has a role in the risk

development for TMJ disk displacement during early adulthood, correction of the reverse articulation during adolescence does not replace the disk. [10] Moreover, disk displacement is a common find in studied populations (and malocclusion as well) and in general does not require any complex, irreversible, or invasive approach. [11]

The inclusion of oral appliances for TMD treatment or for sleep-apnea management does not imply any mechanistic explanation beyond the transient shift in joint load, muscle loading, or pharyngeal enlargement (the last one in case of apnea treatment) that accounts for the results expected. In fact, the current evidence shows oral appliance therapy for TMD is not grounded in strict occlusal characteristics, but in placebo/novelty effect and thickness of the material. [8, 12]

Finally, for bruxism, there is no trace of any possible therapeutic role for prosthetic or occlusal treatment. [13]

Can prosthodontics cause TMDs and/or bruxism?

The assumption that prosthodontic treatments that switch the mandibular position or occlusal vertical dimension (OVD) lead to bruxism or TMD is wrong (especially for bruxism). From some authors' point of view, the stomatognathic system has "extraordinary powers of adaptation, both to natural dental-skeletal abnormalities and to iatrogenic modifications". [1, 14] Incidentally, without such adaptation power, how could the accomplishment of prosthetic commitments at a population-based level be feasible? The placement of a restoration in supra-occlusion rarely produces more than a transient muscle pain that usually subsides with or without the interference removal - a transitory TMD symptom that must not be mistaken as real, concrete chronic TMD. [15,16]. Occlusion concepts may not be ignored when planning prosthetic procedures for strictly prosthodontic reasons (intra- or inter-arch stabilization, durability, phonetic ease, functionality, hygiene, etc).

Furthermore, it is highly recommended to avoid abrupt changes that require massive adaptation beyond the normal limits of patient capacities, especially rehabilitations based on preconceived ideal occlusal schemes or interarch relations that disrupt muscle engrams that have developed naturally in patients over decades of life. [1]

In this regard, any precisely determined concept of centric relation or occlusal vertical dimension (OVD) position in the past has no basis for serving as

TMD or bruxism management anymore. Some authors propose to use the habitual position of the interarch relationship as a prosthodontic reference whenever possible[17] and believe that when prosthetic treatments are required to change, it should be accomplished as a minimal shift from that position, as already noted. As a rule, changes must be undertaken only for valid prosthetic reasons and, to be prudent, must be performed over the longest possible period of adaptation with interim restorations possible for a prospective performance appraisal.

Similarly, for bruxism, a well-known central mediated phenomenon, there is no rationale to consider any prosthetic treatment as having a causative role. [9]

How should prosthodontics (for prosthetic reasons) be performed in patients with TMDs and/or bruxism?

This question concerns more closely prosthodontic planning. Regarding patients with TMDs and/or bruxism who require prosthetic work, which is the best restoration choice?

Disk displacement click sounds alone do not constitute contraindications to prosthodontic planning[11] although for a clinician experienced in TMD management, a second opinion is always recommended. Notwithstanding, for patients with ongoing TMDs, the symptoms should be treated in advance, before starting prosthetic works, in special for extensive prosthetic planning. Needless to say, the reason for caution is not grounded in strict anatomical or occlusion concepts. TMD patients are hypervigilant to stressors (for psychological reasons) and may thus adapt less easily to the new anatomical scheme than other people. [18]

Despite authors' claim that the key is the diagnosis, any bruxism diagnostic approach used in routine clinical practice is a challenge. [8] From a practical viewpoint it is prudent to consider, in planning for the probable bruxism patients, straightforward strategies to reduce mechanical trauma, such as increasing support elements, preventing cantilevers, and providing well-distributed contacts. [19] Bone structure and density should be well-characterized before implants, and clinicians should avoid providing immediately loaded implants and nonaxial loads if possible. [20]

As aforementioned by authors, the positional changes of the mandible or an increase in OVD (often required in bruxism patients for esthetic or functional gain)

should be adopted only for prosthetic reasons - none of the various technical resources ever implemented in this regard has shown better results than the others.

Despite the review is named systematic, the guideline of PRISMA[21] was not well followed. The search strategy was well registered but focused only on PubMed database and do not distinguished between sleep from awake bruxism. An explicit statement of the questions for the review was provided, but exclusion and inclusion criteria were not disclosed. There was no thorough report about theoretical references, calibration methods, eligibility criteria of studies, methods of data extracting or confirmation, bias risk evaluation modalities, data synthesis or how the strength and consistency of study design was assessed. Apart from those facts, authors concluded for an absence of RCT on the proposed 3 topics addressing the interaction of TMD, bruxism, and prosthodontics. It must be considered the rise in evidence for non-invasive modalities of treatment over last decades, possibly discouraging RCT for the more invasive methods[22]. Anyhow, based on the current evidence available and the 3 principles of Evidence Based Medicine, that integrates clinical experience and patient values with the best available research information[23] in fact the clinician should provide a straightforward occlusal design for extensive rehabilitations and avoid rigid pre- mechanical concepts in this area.

Caution when planning irreversible occlusal changes in healthy individuals and in patients with TMD and/or bruxism is recommended. Finally, considering the high capacity for adaptation of the masticatory system, it must be remembered that the fact that maladaptive prostheses or any poor intervention occasionally cause TMD symptoms (not a “real TMD”) does not mean that the dental occlusion naturally possessed by the patient, whichever occlusion, causes TMD. These are distinct situations.

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5- CONSIDERAÇÕES FINAIS

5.1 Trabalho principal - dor dentária em adultos de Minas Gerais/Brasil

Ao final, o trabalho reproduziu de forma geral os principais achados observados em outras pesquisas transversais que avaliaram a dor de dente em diversos contextos locais e temporais. A dor dental, como era de se esperar, dada sua característica aguda e de sofrer a influência de diversos fatores etiológicos biológicos como: microbiota oral, características da placa dentária, produção, qualidade e quantidade de saliva e ainda de vários outros fatores que remetem ao acesso a serviços básicos, sejam de prevenção, remoção e desorganização da placa dental, orientação quanto a higiene ou acesso a renda e adequado estímulo aos fatores promotores de saúde, associou-se no presente estudo a variáveis individuais que remetem a todos estes fenômenos, sendo: renda acima de R$1500,00 (como fator de proteção), necessidade de tratamento, presença de cárie de raiz e condições de agravo periodontal. No nível municipal, a única variável que demonstrou força de associação foi a taxa de renda média de até um quarto do salário mínimo, condição que representa regiões com extrema pobreza.

Há que se considerar as diferenças metodológicas para obtenção de variáveis de contexto amplo, como o município, e as variáveis individuais. Deve-se ainda enfatizar a boa ação do serviço público de saúde nacional (SUS), que, aparte suas inúmeras deficiências e vulnerabilidades, tem reduzido gradativamente índices de cáries e agravos bucais associados a queixas de dor dental.

5.2 Produto técnico - Evidências quanto ao tratamento do bruxismo do sono e o planejamento protético em pacientes com DTM e/ou bruxismo

Os conceitos relativos a bruxismo (tanto do sono quanto da vigília) e às disfunções temporomandibulares sofreram modificações consideráveis nas últimas décadas, sendo de fundamental importância a tradução e reelaboração de textos científicos específicos da área, objetivando o aprimoramento do dentista clínico geral sobre ambos os temas. Considera-se seu natural distanciamento da especialidade de Dor orofacial e Disfunção Temporomandibular, especialidade que muitas vezes encontra-se relegada a segundo plano pela classe odontológica e até mesmo pelos centros de formação acadêmicos e clínicos. As complexas relações entre o fenômeno do bruxismo (não mais necessariamente relacionado a patologias) e a

DTM, seja muscular e/ou articular, além de suas interações com a área médica ou questões de âmbito psicológico e social tornam o tema um desafio para quem se debruça sobre a literatura científica da área. Os dois artigos elaborados para publicação em revista científica de prestígio e alcance internacional propiciam um entendimento adequado sobre as evidências e o consenso clínico atuais, trazendo o assunto para a rotina da clínica odontológica e dando sua justa e devida contribuição a este desafio. Em relação aos temas analisados, futuros trabalhos são necessários para teste e validação de outros métodos terapêuticos não invasivos que se encontram à disposição do clínico, para além das placas oclusais. Espera-se também o surgimento de mais revisões translacionais na área, tais como estas que foram apresentadas, propiciando uma atualização mais ágil e acessível ao clínico geral.

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ANEXO A

Artigo 02 publicado no site da revista Journal of Evidence Based Practice

Outline

Article Title and Bibliographic Information
Source of Funding
Type of Study/Design
Keywords
Summary
Commentary and Analysis
References
Vitae

Show full outline

Tables (2)

Table
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ELSEVIER

Journal of Evidence Based Dental Practice

Volume 18, Issue 2, June 2018, Pages 159-161

Review Analysis & Evaluation

Evidence-Based Support for Sleep Bruxism Treatment Other Than Oral Appliances Remains Insufficient

Ricardo Luiz de Barreto Aranha (Reviewer), Mauro Henrique Nogueira Guimarães de Abreu (Reviewer), Júnia Maria Serra-Negra (Reviewer), Renata Castro Martins (Reviewer)

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https://doi.org/10.1016/j.jebdp.2018.03.003 Get rights and content

Article Title and Bibliographic Information

Management of sleep bruxism in adults: A qualitative systematic literature review. **Manfredini D, Ahlberg J, Winocur E, Lobbezoo F**. J Oral Rehab 2015;42:862-74.

Source of Funding

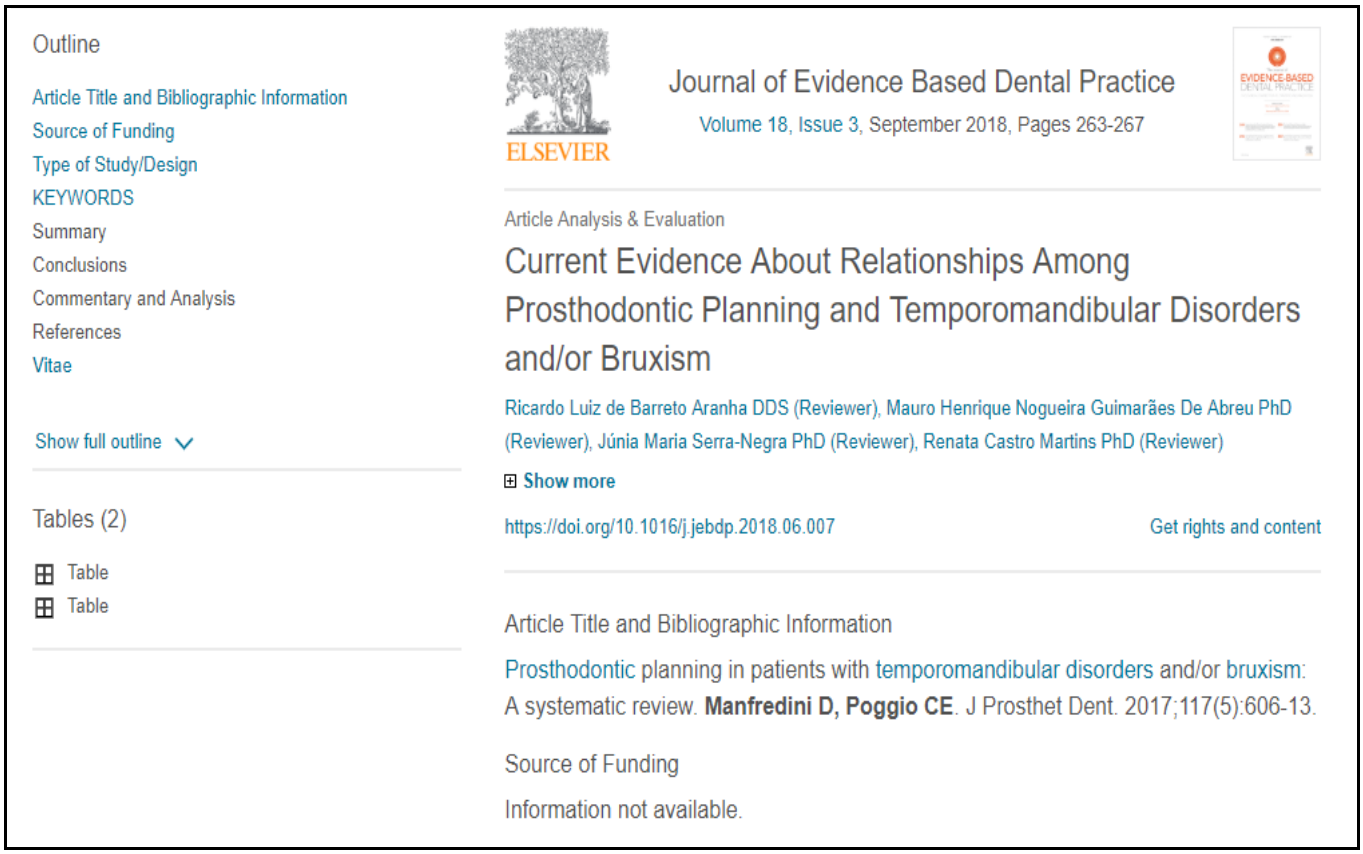
The authors declare that they did not receive any financial support for this article

Type of Study/Design

Systematic review

ANEXO B

Artigo 03 publicado no site da revista Journal of Evidence Based Practice



Outline

Article Title and Bibliographic Information
Source of Funding
Type of Study/Design
KEYWORDS
Summary
Conclusions
Commentary and Analysis
References
Vitae

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Tables (2)

Table
Table

ELSEVIER

Journal of Evidence Based Dental Practice
Volume 18, Issue 3, September 2018, Pages 263-267

Article Analysis & Evaluation

Current Evidence About Relationships Among Prosthodontic Planning and Temporomandibular Disorders and/or Bruxism

Ricardo Luiz de Barreto Aranha DDS (Reviewer), Mauro Henrique Nogueira Guimarães De Abreu PhD (Reviewer), Júnia Maria Serra-Negra PhD (Reviewer), Renata Castro Martins PhD (Reviewer)

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https://doi.org/10.1016/j.jebdp.2018.06.007 Get rights and content

Article Title and Bibliographic Information

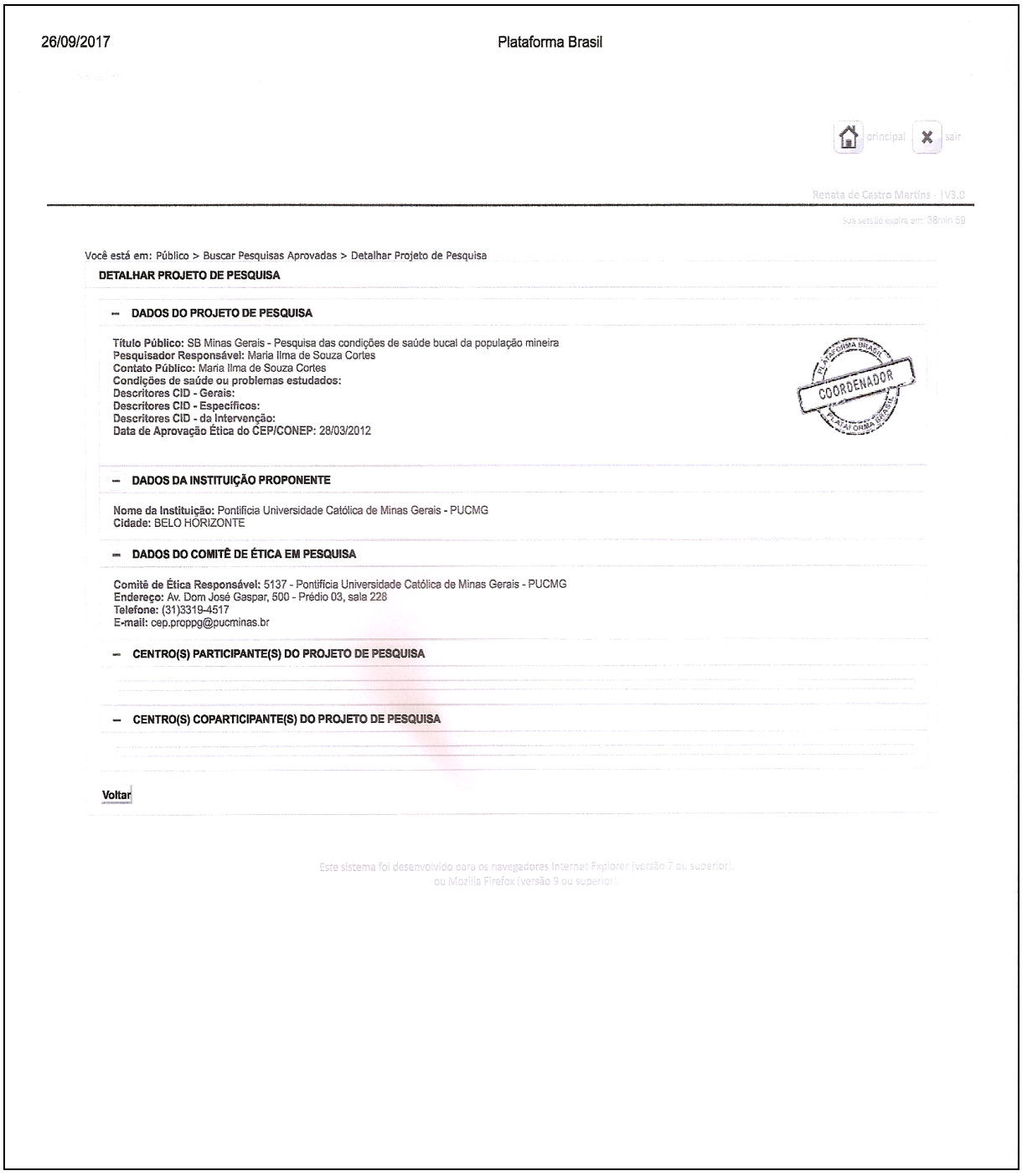
Prosthodontic planning in patients with temporomandibular disorders and/or bruxism: A systematic review. **Manfredini D, Poggio CE**. J Prosthet Dent. 2017;117(5):606-13.

Source of Funding

Information not available.

ANEXO C

Aprovação do Comitê de Ética da Pontifícia Universidade Católica de Minas Gerais



26/09/2017 Plataforma Brasil

principal sair

Renata de Castro Martins - IV3.0

Sua sessão expira em: 38min 59

Você está em: Público > Buscar Pesquisas Aprovadas > Detalhar Projeto de Pesquisa

DETALHAR PROJETO DE PESQUISA

DADOS DO PROJETO DE PESQUISA

Título Público: SB Minas Gerais - Pesquisa das condições de saúde bucal da população mineira
Pesquisador Responsável: Maria Ilma de Souza Cortes
Contato Público: Maria Ilma de Souza Cortes
Condições de saúde ou problemas estudados:
Descritores CID - Gerais:
Descritores CID - Específicos:
Descritores CID - da Intervenção:
Data de Aprovação Ética do CEP/CONEP: 28/03/2012

PLATAFORMA BRASIL COORDENADOR PLATAFORMA BRASIL

DADOS DA INSTITUIÇÃO PROPONENTE

Nome da Instituição: Pontifícia Universidade Católica de Minas Gerais - PUCMG
Cidade: BELO HORIZONTE

DADOS DO COMITÊ DE ÉTICA EM PESQUISA

Comitê de Ética Responsável: 5137 - Pontifícia Universidade Católica de Minas Gerais - PUCMG
Endereço: Av. Dom José Gaspar, 500 - Prédio 03, sala 228
Telefone: (31)3319-4517
E-mail: cep.proppg@pucminas.br

CENTRO(S) PARTICIPANTE(S) DO PROJETO DE PESQUISA

CENTRO(S) COPARTICIPANTE(S) DO PROJETO DE PESQUISA

Voltar

Este sistema foi desenvolvido para os navegadores Internet Explorer (versão 7 ou superior) ou Mozilla Firefox (versão 9 ou superior).

ANEXO D

Formulário eletrônico para cessão do banco de dados da Secretaria de Saúde do Estado de Minas Gerais (SES MG)

SB MINAS GERAIS
Pesquisa das Condições de Saúde Bucal da População Mineira

Secretaria de Estado de Saúde de Minas Gerais
Subsecretaria de Políticas e Ações de Saúde
Superintendência de Redes de Atenção à Saúde
Diretoria de Saúde Bucal
Projeto SBMinas Gerais – Pesquisa das condições de saúde bucal da população mineira

Formulário para cessão do Banco de Dados do Projeto SB Minas Gerais

Dados Pessoais			
Nome Completo	**Renata de Castro Martins**		
Profissão/Ocupação	**Professor Adjunto FO-UFMG**	e-mail	**r.c.martins@uol.com.br**
Currículo Lattes (link)	http://lattes.cnpq.br/9830587097758541		

Dados Institucionais					
Instituição	**Faculdade de Odontologia da Universidade Federal de Minas Gerais**				
Endereço (Rua, nº.)	**Av Antônio Carlos**		Complemento	**6627**	
Bairro	**Pampulha**	Cidade	**Belo Horizonte**	UF	**MG**
CEP	31270-901	Telefone	**3409 2474**	Sítio	**Campus Pampulha**

Outros membros da equipe			
Nome	**Renata de Castro Martins**	e-mail	**r.c.martins@uol.com.br**
Nome	**Mauro Henrique Nogueira Guimarães de Abreu**	e-mail	**maurohenriqueabreu@gmail.com**
Nome	**Ricardo Aranha**	e-mail	**ricardodtm@gmail.com**
Nome	**Rafaela da Silveira Pinto**	e-mail	**rafaelasilveirapinto@gmail.com**

Dados do Projeto de Pesquisa

Resumo estruturado (Introdução, Objetivos, Metodologia e Resultados Esperados) com até 400 palavras

A dor é a razão principal pelas quais as pessoas procuram os serviços de saúde, sendo a dor de dente a mais freqüente entre as dores orofaciais. A dor de dente pode ser resultado da cárie dentária, doença periodontal e traumatismo dentário e diversos fatores têm sido associados a ela, como fatores sócio-econômicos, demográficos, psicológicos, étnicos, culturais e padrões de acesso a serviços odontológicos e utilização dos mesmos. O estudo da dor de origem dentária tem uma importância em Saúde Pública, pois dependendo da sua intensidade, pode causar impacto na qualidade de vida dos indivíduos acometidos e na sociedade. A dor de dente pode gerar custos de forma direta aos serviços de saúde por aumento da demanda por tratamentos emergências e indiretos por ausência ao trabalho e/ou escola e diminuição da produtividade. Desta forma, o objetivo deste estudo será avaliar os fatores associados à dor de dente na população adolescente e adulta de Minas Gerais. Serão utilizados dados secundários do levantamento epidemiológicos SB Minas Gerais, realizado em 2013. A população em estudo serão indivíduos na faixa etária de 12 anos, 15 a 19 anos e 35 a 44 anos. A variável dependente será dor de dente (6 meses), e as covariáveis serão: domínio (capital, interior I e II, estado); sexo; cor ou raça; renda familiar; escolaridade; prevalência de cárie dentária de coroa em dentição decídua (ceo-d) e permanente (CPOD-D); prevalência de cárie de raiz; necessidade de tratamento de cárie dentária; condição periodontal; local de atendimento (público, privado/convênios); necessidade de tratamento para cárie dentária; condição periodontal; traumatismo dentário; necessidade geral de tratamento dentário; morbidade dentária auto-referida (morbidade dentária, gravidade da dor de dente); uso de serviços odontológicos (consulta ao dentista, frequência da consulta, onde consultou, motivo da última consulta, avaliação da última consulta); impactos da saúde bucal na vida diária (satisfação com dente e boca, dimensões do OIDP). Os dados serão analisados no programa IBM SPSS Software versão 22.0. Será realizada uma análise descritiva dos dados. Análises estatísticas pertinentes serão realizadas considerando uma significância de 5%. Espera-se obter uma melhor compreensão sobre os fatores que têm um maior impacto sobre a dor dentária a fim de propiciar o planejamento de estratégias para o enfrentamento este problema de saúde pública.

ANEXO E
Termo de Compromisso para cessão do banco de dados da Secretaria de Saúde do Estado de Minas Gerais (SES MG)

Secretaria de Estado de Saúde de Minas Gerais
Subsecretaria de Políticas e Ações de Saúde
Superintendência de Redes de Atenção à Saúde
Diretoria de Saúde Bucal
Projeto SBMinas Gerais – Pesquisa das condições de saúde bucal da população mineira

Termo de Compromisso

Declaro que, ao ter acesso aos microdados do **Projeto SBMinas Gerais – Pesquisa das condições de saúde bucal da população mineira**, farei uso do mesmo unicamente para fins de pesquisa e produção do conhecimento. Estou ciente que esta é uma base pública produzida com recursos públicos e que deve, prioritariamente, gerar conhecimento e tecnologia voltados para o crescimento e a consolidação do Sistema Único de Saúde (SUS).

Assumo o compromisso, junto a Secretaria de Estado de Saúde de Minas Gerais de (a) citar a fonte dos dados em toda e qualquer publicação dela decorrente; (b) incluir a Secretaria de Estado de Saúde na seção de agradecimentos das publicações e (c) enviar cópia do relatório de pesquisa e/ou artigo publicado com os resultados decorrentes do uso do banco de dados à Diretoria de Saúde Bucal/SES-MG.

Local Belo Horizonte

Data 05/07/2017

Nome Renata de Castro Martins

Assinatura Renata de Castro Martins

ANEXO F
Autorização para o acesso ao banco de dados da Secretaria de Saúde do Estado de Minas Gerais (SES MG).

26/09/2017 ENC: Cessão do Banco de dados do SB Minas Gerais - r.c.martins@uol.com.br - UOL Mail

UOL mail

ENC: Cessão do Banco de dados do SB Minas Gerais

De: **saudebucal**
Para: **r.c.martins@uol.com.br**
Cópia: **saudebucal@saude.mg.gov.br ,mayla.sousa@saude.mg.gov.br**
Cópia oculta:
Assunto: ENC: Cessão do Banco de dados do SB Minas Gerais
Data: 25/07/2017 16:27
Banco Publico.rar **335.66 KB**

Prezada Renata,

Em retorno à sua solicitação enviamos Banco de Dados SB Minas Gerais em anexo.

Esclarecemos que o banco de dados está sendo disponibilizado para o estudo descrito no Formulário de Solicitação e que para o uso do mesmo em outros estudos será necessário envio de novos formulários de solicitação.

Agradecemos se puder confirmar o recebimento desse e mail.

Att,

Coordenação de Saúde Bucal

Diretoria de Políticas de Atenção Primária à Saúde

ANEXO G
Normas para publicação no periódico Brazilian Oral Research

MISSION, SCOPE, AND SUBMISSION POLICY

Brazilian Oral Research - BOR (online version ISSN 1807-3107) is the official publication of the *Sociedade Brasileira de Pesquisa Odontológica* - SBPqO (the Brazilian division of the International Association for Dental Research - IADR). The journal has an Impact Factor™ of 0.937 (Institute for Scientific Information - ISI), is peer-reviewed (double-blind system), and its mission is to disseminate and promote an information interchange concerning the several fields in dentistry research and/or related areas with gold open access.

BOR invites the submission of original and review manuscripts and papers in the following typology: Original Research (complete manuscript or Short Communication), Critical Review of Literature, Systematic Review (and Meta-Analysis) and Letters to the Editor. All submissions must be exclusive to.

Manuscripts and all corresponding documentation should be exclusively submitted through ScholarOne Manuscripts™ via the online submission link (http://mc04.manuscriptcentral.com/bor-scielo).

The evaluation process of manuscript's scientific content will only be initiated after meeting of all the requirements described in the present Instructions for Authors. Any manuscript that does not meet these requirements will be returned to the corresponding author for adaptations.

Important: Once having been accepted on their scientific merit, all manuscripts will be submitted for grammar and style revision as per the English language. Contact BOR by bor@sbpqo.org.br to get information about the recommended translation companies.The authors should forward the revised text with the enclosed revision certificate provided by the chosen editing company. **Linguistic revisions performed by companies that do not provide the mentioned certificate will not be accepted.** As an exception, this rule does not apply when one of the authors is a native English speaker

PRESENTATION OF THE MANUSCRIPT

The manuscript text should be written in English and provided in a digital file compatible with “Microsoft Word” (in DOC, DOCX, or RTF format).

All figures (including those in layouts/combinations) must be provided in individual and separate files, according to recommendations described under the specific topic.

Photographs, micrographs, and radiographs should be provided in TIFF format, according to the recommendations described under the specific topic.

Charts, drawings, layouts, and other vector illustrations must be provided in a PDF format individually in separate files, according to the recommendations described under the specific topic.

Video files may be submitted as per the specifications, including the author's anonymity (for purposes of evaluation) and respect for the patient's rights.

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5. Cancer Research UK. Cancer statistics reports for the UK. http://www.cancerresearchuk.org/ aboutcancer/statistics/cancerstatsreport/; 2003 Accessed 13 March 2003.

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