UNIVERSIDADE FEDERAL DO RIO DE JANEIRO
Centro de Ciências da Saúde
Faculdade de Odontologia

PULPECTOMIA: PUBLICAÇÕES, EVIDÊNCIAS CIENTÍFICAS E INFLUÊNCIA DA PANDEMIA DE COVID-19

Natália Rocha Bedran

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Tese de doutorado submetida ao Programa de Pós-graduação em Odontologia (Área de Concentração: Odontopediatria) da Faculdade de Odontologia da Universidade Federal do Rio de Janeiro como parte dos requisitos para obtenção do título de Doutor em Odontologia (Área de Concentração: Odontopediatria).

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Para Deus, meu maior provedor e guia!

Para meus pais, minhas irmãs, meu marido e minha filha,
por estarem comigo em todos os momentos, segurarem
minhas mãos e serem meus maiores torcedores.

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RESUMO

BEDRAN, Natália Rocha. **PULPECTOMIA: PUBLICAÇÕES, EVIDÊNCIAS CIENTÍFICAS E INFLUÊNCIA DA PANDEMIA DE COVID-19.** Rio de Janeiro, 2022. Tese (Doutorado em Odontologia – Área de Concentração: Odontopediatria) – Faculdade de Odontologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2022.

Objetivou-se analisar o panorama das publicações sobre pulpectomia, de forma geral, além de verificar as evidências acerca do potencial de redução de endotoxinas pelo hidróxido de cálcio e investigar a influência da pandemia de COVID-19 em relação à realização de procedimentos endodônticos em Odontopediatria. Para tanto, foram realizados três estudos. O primeiro visou mapear e discutir, por meio de uma revisão bibliométrica, o panorama das publicações científicas acerca da pulpectomia em dentes decíduos utilizando os termos “pulpectomy”, “root canal”, “child” AND “preschoolar”. O segundo estudo delineou-se como uma revisão sistemática, seguida de metanálise objetivando verificar se existem evidências de redução de endotoxinas antes e depois do uso de hidróxido de cálcio como medicação intracanal em canais radiculares infectados. Riscos de avaliação de viés e metanálises foram realizados. A certeza de evidência foi determinada pelo GRADE. O terceiro estudo pretendeu verificar as possíveis influências da pandemia de COVID-19 na realização de procedimentos endodônticos em Odontopediatria, por meio da aplicação de um questionário eletrônico composto por perguntas divididas em 3 domínios: (1) informações profissionais; (2) gerenciamento de biossegurança e (3) protocolo endodôntico de atendimento antes e durante a pandemia. Após a realização dos três estudos, foi identificada uma tendência na pesquisa científica para a utilização de instrumentação mecanizada e pastas obturadoras mais biocompatíveis e eficazes. Foi possível observar ausência de estudos clínicos multicêntricos sobre procedimentos de pulpectomia em dentes decíduos. A maioria dos estudos foi publicada em periódicos de Odontopediatria, apresentaram ampla variedade de protocolos de tratamento e foram realizados principalmente em países em desenvolvimento, denotando claro viés nas opções de tratamento oferecidas para crianças em todo o mundo, uma vez que o acesso aos serviços de anestesia geral em países desenvolvidos favorece a exodontia dos dentes com comprometimento pulpar. Além disso, concluiu-se que o hidróxido de cálcio reduz os níveis de endotoxinas quando usado como medicação intracanal, mas é incapaz de eliminá-las completamente em dentes permanentes, independentemente de sua associação com alguma solução irrigante. Não foram recuperados artigos em dentes decíduos. No terceiro estudo, a amostra final foi composta por 313 participantes de todos os estados brasileiros. A maioria dos participantes era do sexo feminino (90,35%), e mais da metade cursou Odontopediatria em instituição privada (50,25%) há mais de dez anos (53,63%) e trabalha em metrópole (54,75%). No geral, a maioria dos respondentes atualmente prática Odontopediatria exclusivamente em clínicas privadas (61,63%). Durante a pandemia de COVID-19 foi possível ver um aumento na complexidade dos casos planejados previamente e da quantidade de urgências odontológicas. Levando isso em consideração, muitos odontopediatras sentiram a necessidade de se reinventarem, priorizando técnicas minimamente invasivas e com um menor tempo de consulta. Com isso, pôde-se notar uma tendência pela busca do tratamento endodôntico não instrumental ($p<0,01$), justamente por ser uma técnica mais rápida e barata. Apesar de já existirem muitos trabalhos publicados acerca da endodontia em dentes decíduos, conforme constatado nos dois primeiros estudos, observa-se que ainda são necessárias novas investigações nessa área.

Palavras-chave: Dente decíduo, Pulpectomia, TENI, LSTR, Endodontia, LPS, Hidróxido de cálcio, Protocolos Clínicos, Odontopediatria.

ABSTRACT

BEDRAN, Natália Rocha. **PULPECTOMY: PUBLICATIONS, SCIENTIFIC EVIDENCE AND THE INFLUENCE OF THE COVID-19 PANDEMIC.**
Rio de Janeiro, 2022. Tese (Doutorado em Odontologia – Área de Concentração: Odontopediatria) – Faculdade de Odontologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2022.

The objective was to analyze the overview of publications on pulpectomy, in general, in addition to verifying the evidence about the potential for endotoxin reduction by calcium hydroxide and to investigate the influence of the COVID-19 pandemic in relation to the performance of endodontic procedures in Pediatric Dentistry. Therefore, three studies were carried out. The first aimed to map and discuss, through a bibliometric review, the panorama of scientific publications about pulpectomy in primary teeth using the terms “pulpectomy”, “root canal”, “child” AND “preschooler”. The second study was designed as a systematic review, followed by a meta-analysis aiming to verify if there is evidence of endotoxin reduction before and after the use of calcium hydroxide as an intracanal medication in infected root canals. Bias assessment risks and meta-analyses were performed. The certainty of evidence was determined by GRADE. The third study aimed to verify the possible influences of the COVID-19 pandemic on the performance of endodontic procedures in Pediatric Dentistry, through the application of an electronic questionnaire composed of questions divided into 3 domains: (1) professional information; (2) biosafety management and (3) endodontic care protocol before and during the pandemic. After carrying out the three studies, a trend in scientific research towards the use of mechanized instrumentation and more biocompatible and effective filling pastes was identified. It was possible to observe the absence of multicenter clinical studies on pulpectomy procedures in primary teeth. Most studies were published in pediatric dentistry journals, presented a wide variety of treatment protocols, and were carried out mainly in developing countries, denoting a clear bias in the treatment options offered to children around the world, since access to care services general anesthesia in developed countries favors extraction of teeth with pulp involvement. Furthermore, it was concluded that calcium hydroxide reduces the levels of endotoxins when used as an intracanal medication but is unable to completely eliminate them in permanent teeth, regardless of its association with some irrigating solution. No articles in primary teeth were retrieved. In the third study, the final sample consisted of 313 participants from all Brazilian states. Most of the participants were female (90.35%), and more than half had studied Pediatric Dentistry at a private institution (50.25%) for over ten years (53.63%) and worked in a metropolis (54.75%). Overall, the majority of respondents currently practice Pediatric Dentistry exclusively in private clinics (61.63%). During the COVID-19 pandemic, it was possible to see an increase in the complexity of previously planned cases and the number of dental emergencies. Taking this into account, many pediatric dentists felt the need to reinvent themselves, changing case plans, prioritizing minimally invasive techniques and with less chair time. Thus, a trend towards the search for non-instrumental endodontic treatment ($p<0.001$) could be noted, precisely because it is a faster and cheaper technique. Although there are many published works about endodontics in deciduous teeth, as seen in the first two studies, it was observed that further investigations are still needed.

Keywords: Primary tooth, Pulpectomy, TENI, LSTR, Endodontics, LPS, Calcium hydroxide, Clinical protocols, Pediatric dentistry.

RESUMEN

BEDRAN, Natalia Rocha. PULPECTOMIA: PUBLICACIONES, EVIDENCIA CIENTIFICA Y LA INFLUENCIA DE LA PANDEMIA COVID-19. Rio de Janeiro, 2022. Tesis (Doctorado en Odontología – Área de Concentración: Odontopediatría) – Faculdade de Odontologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2022.

El objetivo fue analizar el panorama de publicaciones sobre pulpectomía, en general, además de verificar la evidencia sobre el potencial de reducción de endotoxinas por hidróxido de calcio e investigar la influencia de la pandemia de COVID-19 en relación con la realización de procedimientos de endodoncia en Odontología Pediatrica. Por lo tanto, se llevaron a cabo tres estudios. El primero tuvo como objetivo mapear y discutir, a través de una revisión bibliométrica, el panorama de las publicaciones científicas sobre pulpectomía en dientes primarios utilizando los términos “pulpectomía”, “endodoncia”, “niño” Y “preescolar”. El segundo estudio fue diseñado como una revisión sistemática, seguido de un metanálisis con el objetivo de verificar si existe evidencia de reducción de endotoxinas antes y después del uso de hidróxido de calcio como medicación intracanal en conductos radiculares infectados. Se realizaron evaluaciones de riesgo de sesgo y metanálisis. La certeza de la evidencia fue determinada por GRADE. El tercer estudio tuvo como objetivo verificar las posibles influencias de la pandemia de COVID-19 en la realización de procedimientos de endodoncia en Odontopediatría, mediante la aplicación de un cuestionario electrónico compuesto por preguntas divididas en 3 dominios: (1) información profesional; (2) manejo de bioseguridad y (3) protocolo de atención en endodoncia antes y durante la pandemia. Luego de realizar los tres estudios, se identificó una tendencia en la investigación científica hacia el uso de instrumentación mecanizada y pastas de obturación más biocompatibles y efectivas. Se pudo observar la ausencia de estudios clínicos multicéntricos sobre procedimientos de pulpectomía en dientes primarios. La mayoría de los estudios fueron publicados en revistas de odontopediatría, presentaron una amplia variedad de protocolos de tratamiento y fueron realizados principalmente en países en vías de desarrollo, denotando un claro sesgo en las opciones de tratamiento que se ofrecen a los niños de todo el mundo, ya que el acceso a los servicios de atención de anestesia general en los países desarrollados favorece la extracción de dientes con afectación pulpar. Además, se concluyó que el hidróxido de calcio reduce los niveles de endotoxinas cuando se usa como medicamento intracanal, pero no logra eliminarlas por completo en los dientes permanentes, independientemente de su asociación con alguna solución de irrigación. No se recuperaron artículos en dientes primarios. En el tercer estudio, la muestra final estuvo compuesta por 313 participantes de todos los estados brasileños. La mayoría de los participantes era del sexo femenino (90,35%), y más de la mitad había estudiado Odontopediatría en una institución privada (50,25%) hace más de diez años (53,63%) y trabajaba en una metrópoli (54,75%). En general, la mayoría de los encuestados actualmente ejerce la Odontopediatría exclusivamente en clínicas privadas (61,63%). Durante la pandemia de COVID-19, fue posible ver un aumento en la complejidad de los casos previamente planificados y el número de emergencias dentales. Teniendo esto en cuenta, muchos odontopediatras sintieron la necesidad de reinventarse, cambiando de planes de casos, priorizando técnicas mínimamente invasivas y con menos tiempo de sillón. Así, se pudo notar una tendencia hacia la búsqueda de tratamientos endodónticos no instrumentales ($p<0,001$), precisamente por ser una técnica más rápida y económica. Aunque ya existen muchos trabajos publicados sobre endodoncia en dientes temporales, como se observa en los dos primeros estudios, se observa que aún se necesitan más investigaciones en esta área.

Palabras clave: Diente primario, Pulpectomía, TENI, LSTR, Endodoncia, LPS, Hidróxido de calcio, Protocolos clínicos, Odontopediatría.

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LISTA DE SIGLAS

AAPD	*American Academy of Pediatric Dentistry*
AS	*Antimicrobial Substance*
BBO	Bibliografia Brasileira de Odontologia
BVS	Biblioteca Virtual em Saúde
CD	Cannot be determined
CEP	Código de Endereçamento Postal
CFO	Conselho Federal de Odontologia
CI	*Confidence Interval*
COVID	*Corona Virus Disease*
CMP	*Chemo mechanical Preparation*
CTZ	Pasta composta por cloranfenicol, tetracilina, óxido de zinco e eugenol / *Paste composed of chloramphenicol, tetracycline, zinc oxide and eugenol*
EUA	Estados Unidos da América
FMP	Faculdade de Medicina de Petrópolis
GIC	*Glass Ionomer Cement*
GRADE	*Grading Recommendations, Assessments, Development, and Evaluations*
HUCFF	Hospital Universitário Clementino Fraga Filho
ICM	*Intracanal Medication*
IBGE	Instituto Brasileiro de Geografia Estatística
IC	Intervalo de Confiança
ICF	*Informed Consent Form*
KQCL	Chromogenic Kinetic Assay
LILACS	Literatura Latino-Americana e do Caribe em Ciências da Saúde
LPS	*Lipopolysaccharides*
LSTR	*Lesion Sterilization and Tissue Repair*
MeSH	*Medical Subject Headings*
NA	Não aplicável
NIET	*Non-Instrumental Endodontic Treatment*

NR	Não relatado
OZE	Óxido de zinco e eugenol
PICO	*Population, Intervention, Comparison e Outcome*
PRISMA	*Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols*
PROSPERO	*International Prospective Register of Systematic Reviews*
QCL	*Quantitative Chromogenic Assay*
RB	*Risk of Bias*
RCT	*Randomized Controlled Trial*
RJ	Rio de Janeiro
SMD	*Standardized Mean Difference*
STROBE	*Strengthening the Reporting of Observational Studies in Epidemiology*
TCLE	Termo de Consentimento Livre e Esclarecido
TKA	*Turbidimetric Kinetic Assay*
TNF	*Tumor Necrosis Factor*
UFRJ	Universidade Federal do Rio de Janeiro
UK	*United Kingdom*
UNIFASE	Centro Universitário Arthur Sá Earp Neto
USA	*United States of America*
ZOE	*Zinc oxide and Eugenol*

LISTA DE ABREVIATURAS

$Ca(OH)_2$	Hidróxido de cálcio
CoI	Colaboradores
e.g.	Por exemplo, do latim *exempli gratia*
e-mail	*Electronic mail*
F	Feminino / *Female*
h	Hora / *Hour*
I^2	Heterogeneity
i.e.	Isto é, *do latim id est*
Inc	*Incorporated*
M	Masculino / *Male*
n	número absoluto
Nº	*Number*
p	Valor-p / *p-value*
r	Ramal
v	Versão / *Version*

LISTA DE SÍMBOLOS

%	Porcentagem
<	Menor que
≤	Menor ou igual a
=	Igual
±	Mais ou menos
®	Marca registrada
™	Trademark

SUMÁRIO

1. INTRODUÇÃO

A pulpectomia é uma técnica indicada para dentes decíduos com inflamação irreversível ou necrose pulpar (AAPD, 2020). Existe uma ampla variedade de protocolos clínicos para pulpectomia em dentes decíduos disponíveis na prática clínica (COLL *et al.,* 2020). Muitos estudos têm comparado diferentes técnicas de instrumentação (OCHOA-ROMERO *et al.,* 2011; GULER, GURBUZ & YILMAZ, 2013), de irrigação (KAUR *et al.,* 2014; VENGHAT *et al*., 2014) e de obturação dos canais radiculares (PRAMILA et al., 2016; FUKS *et al.,* 2019) com materiais biocompatíveis e bioativos aos tecidos periapicais (PIRES *et al.,* 2016). No entanto, ainda não há consenso sobre quais protocolos ou materiais são melhores (SMAÏL-FAUGERON *et al.,* 2018). Devido a enorme variedade de protocolos, muitos clínicos ficam sem saber qual técnica seguir ou material usar, sendo importante um estudo que reúna as principais características sobre as publicações em pulpectomia.

O tratamento de pulpectomia é considerado desafiador, principalmente em molares decíduos, devido a características inerentes a anatomia destes, como presença de um canal principal estreito e tortuoso (AHMED, 2013), mudanças na localização do forame apical resultantes da reabsorção fisiológica ou patológica (RIMONDINI & BARONI 1995) e presença de canais acessórios (LUGLIÈ *et al.,* 2012). Necessário destacar, ainda, outras dificuldades encontradas para o tratamento de dentes com necrose pulpar e lesão periapical, já que nestas situações o tecido pulpar não está vital e os microrganismos encontram-se disseminados por todo o sistema de canais radiculares - áreas inacessíveis ao preparo biomecânico e ao sistema de defesa do organismo (ØRSTAVIK *et al.,* 1991; ROCHA *et al.,* 2008). Além disso, também sabe-se que nos dentes com necrose pulpar e lesão periapical a infecção é polimicrobiana,

com predomínio de microrganismos anaeróbios, particularmente Gram-negativos (ITO *et al*., 2011), que apresentam a endotoxina ou lipopolissacarídeos (LPS) em sua parede celular (DE QUEIROZ *et al.,* 2016) - que é liberada no meio extracelular após a morte ou a multiplicação dos microrganismos. Tal processo estimula a resposta inflamatória, osteoclastogênese e reabsorção cementária e óssea (RIETSCHEL & BRADE, 1992). Por essas razões, o uso de medicação intracanal entre sessões nesses dentes pode tornar-se necessária (SILVA *et al*., 2014).

Até o momento, apenas o hidróxido de cálcio ($Ca(OH)_2$) é descrito na literatura como material capaz de atuar sobre endotoxinas bacterianas. Barthel et al. (1997) e Olsen et al. (1999) avaliaram, *in vitro*, a capacidade de neutralização da endotoxina bacteriana pelo hidróxido de cálcio e relataram que esse produto decompõe as ligações éster na porção lipídica do LPS (OLSEN *et al.,* 1999) e alteram as propriedades biológicas das endotoxinas (BARTHEL *et al,* 1997). Embora muitos estudos tenham abordado o $Ca(OH)_2$ como o melhor curativo de demora (DE OLIVEIRA *et al,* 2012; XAVIER *et al.,* 2013; SOUSA *et al.,* 2014), ainda existem dúvidas sobre sua eficácia em eliminar completamente a LPS e o real benefício da medicação intracanal no sucesso geral do tratamento endodôntico (VIANNA *et al.,* 2007).

Devido às dificuldades inerentes ao tratamento endodôntico em dentes decíduos, é de grande importância buscar a melhor evidência a partir de uma revisão sistemática da literatura sobre o efeito do hidróxido de cálcio na inibição da liberação das LPS produzidas por bactérias no tratamento endodôntico infantil. Inicialmente, além de buscar evidências acerca do potencial de medicação intracanal à base de hidróxido de cálcio, o projeto de Tese incluía avaliações *in vitro e in vivo* a fim de determinar a eficácia na redução das LPS. Porém, devido o surgimento da pandemia causada pelo

Corona vírus 2 da Síndrome Respiratória Aguda Grave (SARS-CoV-2), os planos precisaram ser alterados.

Em dezembro de 2019, a síndrome respiratória aguda causada pelo SARS-CoV-2 criou um estado de emergência em Wuhan, na China (HUANG *et al*., 2020). Logo, a doença chamada de COVID-19, afetou o mundo todo e a Organização Mundial de Saúde (OMS) declarou a pandemia em 11 de março de 2020 (SUN *et al*., 2020; WHO, 2021). O SARS-CoV-2 é transmitido por meio de gotículas respiratórias em suspensão no ar ou aerossóis ou por contato direto ou indireto (The Chinese Preventive Medicine Association, 2020; QIU *et al.*, 2021). A potencial disseminação nosocomial de patógenos (SARS-CoV-2) por meio da aerossolização do fluido oral, mesmo em procedimentos de rotina (SABINO-SILVA, JARDIM & SIQUEIRA, 2020), oferece risco significativo para pacientes, dentistas e equipes de saúde bucal (VERNON *et al*., 2021).

Considerando a pandemia, fornecer atendimento odontológico eficiente e manter a equipe odontológica e os pacientes seguros (PARHAR *et al,* 2020) através de protocolos de proteção rígida dos sujeitos envolvidos e desinfecção do ambiente são essenciais para minimizar o risco de infecção cruzada. Nesse sentido, protocolos odontológicos menos complexos, mais rápidos e de melhor custo-benefício, mas igualmente efetivos seriam relevantes na prática endodôntica em Odontopediatria.

À vista disso, sugere-se como alternativa interessante para a terapia pulpar em dentes decíduos com um menor tempo de cadeira, o Tratamento Endodôntico Não Instrumental (TENI). Este foi proposto por um grupo de pesquisadores da Universidade Niigata, durante os anos 1990, sob a premissa de que uma mistura de três antibióticos seria capaz de inibir o crescimento bacteriano de lesões em dentina cariada e tecido pulpar infectado. Com base nesse raciocínio, os canais radiculares

não seriam instrumentados e uma pasta tri-antibiótica colocada sobre a polpa radicular irreversivelmente inflamada teria potencial de paralisar o processo infeccioso (SATO *et al.,* 1993; SATO *et al.,* 1996; HOSHINO *et al.,* 1996). Posteriormente, o mesmo grupo de pesquisadores divulgou resultados clínicos da técnica em dentes decíduos necrosados através de um estudo retrospectivo, sendo a técnica denominada então de "*Lesion Sterilization and Tissue Repair* (LSTR)" (TAKUSHIGE *et al.,* 2004). Os resultados relatados no estudo foram favoráveis, o que incentivou a investigação do tratamento recentemente por outros pesquisadores (RASLAN *et al.,* 2017; LUENGO *et al.,* 2019; ZACHARCZUK *et at.,* 2019).

A COVID-19 afetou globalmente a odontologia e terá efeitos prolongados, mesmo depois que os casos diminuam. Após a flexibilização das restrições globais relativas ao COVID-19, poderão ocorrer alterações nas práticas recomendadas em Odontopediatria, logo, é importante entender e determinar o que irá permanecer e o que não será mais seguido. Dessa forma, será de grande valia avaliar as influências da pandemia de COVID-19 nas práticas clínicas, especificamente em relação a terapia pulpar em Odontopediatria.

Levando em consideração as lacunas presentes acerca do tratamento endodôntico em dentes decíduos, a enorme variedade de protocolos disponíveis e a situação atual de pandemia que estamos vivenciando, este trabalho torna-se extremamente relevante.

2. PROPOSIÇÃO

2.1 Objetivo geral

Revisar o panorama das publicações sobre pulpectomia, buscar evidências acerca do potencial de redução de LPS pelo hidróxido de cálcio e investigar a influência da pandemia de COVID-19 em procedimentos endodônticos realizados em Odontopediatria.

2.2 Objetivos específicos

- Mapear e discutir, por meio de uma revisão bibliométrica, o panorama das publicações cientificas acerca da pulpectomias em dentes decíduos.
- Buscar evidências quanto ao potencial de redução ou eliminação de endotoxinas através do uso de hidróxido de cálcio como medicação intracanal em dentes decíduos, por meio de uma revisão sistemática da literatura e metanálise.
- Investigar, por meio da aplicação de um questionário eletrônico, as mudanças nos procedimentos endodônticos em Odontopediatria realizados durante a pandemia de COVID-19.

3. DELINEAMENTO DA PESQUISA

3.1 Tipo de estudo

Com o propósito de responder a cada objetivo específico, a presente Tese é composta por três estudos de desenhos metodológicos distintos: 1) uma revisão bibliométrica; 2) uma revisão sistemática da literatura com metanálise e 3) um estudo observacional transversal.

3.2 Locais de execução do estudo

Os estudos foram realizados de forma híbrida tanto no Departamento de Odontopediatria e Ortodontia da Faculdade de Odontologia da Universidade Federal do Rio de Janeiro (FO/UFRJ, Rio de Janeiro, Brasil) quanto de forma remota.

3.3 Primeiro estudo

O primeiro estudo analisou as publicações acerca do tema pulpectomia de dentes decíduos, identificou e agrupou os dados bibliométricos disponíveis e discutiu características relacionadas ao protocolo.

Os artigos foram pesquisados utilizando os termos “pulpectomy” OR “root canal” AND “child” OR “preschool”, seus termos do vocabulário controlados e termos relacionados nas bases de dados eletrônicas MEDLINE/ via PubMed, Scopus, EMBASE, Web of Science, Cochrane Library e Biblioteca Virtual em Saúde (BVS/LILACS e BBO). Não foram aplicadas restrições ao ano de publicação ou idioma e as buscas foram realizadas em outubro de 2021.

Os estudos incluídos deveriam ser clínicos, de natureza intervencionista, retrospectivos ou prospectivos, com ou sem grupo controle ou de comparação, em que um dos desfechos foi a avaliação dos protocolos de tratamento da pulpectomia

em dentes decíduos. Não foram incluídos estudos em animais, relatos de casos, séries de casos, estudos *in vitro* e *ex vivo*, revisões, metanálises e diretrizes.

Uma tabela gerada pelo programa VantagePoint® (Search Technology, Inc., Flórida, EUA) foi utilizada para que os três revisores (NRB, MLD, MCS) pudessem realizar o processo de seleção individualmente, por meio de avaliação dos títulos e resumos de cada estudo recuperado das bases de dados de acordo com os critérios de elegibilidade. As duplicatas foram removidas manualmente. Eventuais divergências quanto à elegibilidade dos estudos foram resolvidas por consenso ou com o auxílio de pesquisadores experientes em estudos bibliométricos (FA) e pulpectomia (LGP).

Após a seleção dos estudos, os mesmos três revisores (NRB, MLD, MCS) realizaram a extração de dados de interesse: (1) dados bibliométricos: as palavras mais citadas, o ano de publicação, a contagem de citações, periódicos, autores, afiliações, instituições e país; (2) dados clínicos: dente tratado (anterior ou posterior), método de instrumentação (manual e / ou mecânico), substância de irrigação utilizada (hipoclorito de sódio – NaOCl -, soro fisiológico, clorexidina, outras ou não relatadas), método de obturação (obturação manual, mecânica ou por seringa), tipo de pasta obturadora (agrupada por seus componentes principais: pasta à base de iodofórmio, pasta à base de $Ca(OH)_2$, pasta à base de cimento de óxido de zinco e eugenol (OZE), pasta mista – composta por uma combinação de hidróxido de cálcio e iodofórmio -outros), material restaurador, número de sessões e tipo de medicação intracanal entre as consultas, se usada.

Além disso, a categorização quanto ao tema principal do artigo foi feita com base no desfecho primário do estudo, a saber: método de acesso, medição do comprimento de trabalho, técnica de instrumentação, soluções irrigantes, medicação intracanal, técnica de obturação de canais radiculares, material de obturação radicular,

restauração de coroa ou comparação entre diferentes terapias pulpares, quando por exemplo, a pulpectomia foi comparada com pulpotomia. Os artigos que abordavam dois ou mais tópicos relacionados ao protocolo de tratamento para pulpectomia foram registrados mais de uma vez. Eventuais divergências quanto à classificação quanto ao tema principal do artigo foram resolvidas por consenso entre os revisores.

Todos esses dados foram extraídos manualmente pelos pesquisadores e analisados por meio do software VantagePoint® (Search Technology, Inc., Flórida, EUA). Se alguma das variáveis referidas não estivesse descrita no artigo, nem fosse obtida após contato com os autores, o dado foi classificado como "não relatado".

Análise dos dados

Análises de dados bibliométricos como correlação entre autores que publicaram três ou mais artigos e a revista onde esses trabalhos foram publicados foram realizadas no VantagePoint ™ (Search Technology, Inc., Flórida, EUA) e Microsoft Office Excel 2010 (Microsoft®, EUA). Valores de frequência (absolutos e relativos) foram calculados para todas as variáveis.

Algumas análises descritivas de dados de protocolo no mesmo estudo podem conter uma ou mais opções de classificação para a mesma variável. Isso criou uma frequência maior dessas variáveis do que o número de estudos incluídos.

3.4 Segundo estudo

O segundo estudo investigou, por meio de revisão sistemática da literatura e metanálise, as evidências quanto à redução ou eliminação de endotoxinas por meio de medicação intracanal à base de hidróxido de cálcio através da pergunta foco: ”O hidróxido de cálcio é eficaz contra endotoxinas nos canais infectados dos dentes decíduos e permanentes?”

O protocolo do estudo foi registrado em um banco de registros internacional de revisões sistemáticas, o PROSPERO (*International Prospective Register of Systematic Reviews*), sob o número CRD42019124394. Além disso, a revisão foi relatada seguindo um conjunto de itens com base em evidências para relatar revisões sistemáticas e meta-análises, o PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols*) (Moher D et al., 2009; Shamseer et al., 2015).

As chaves de busca foram elaboradas com base na estratégia PICO (P = Canais infectados de dentes decíduos e permanentes, I = Presença e concentração de endotoxinas após o preparo químico mecânico e preenchimento dos canais radiculares com medicação à base de hidróxido de cálcio, C = Presença e concentração de endotoxinas antes do preparo químico mecânico e preenchimento dos canais radiculares com hidróxido de cálcio, O = Redução da concentração de LPS). Incluíram-se termos MeSH (*Medical Subject Headings*) e seus sinônimos, além de palavras-chave, tendo sido desenvolvidas inicialmente para a base MEDLINE/via PubMed e adaptada para as demais bases de dados, sob orientação de bibliotecária com experiência em revisões sistemáticas (DMF).

Realizou-se busca sistemática da literatura nas seguintes bases de dados: MEDLINE/ via PubMed, Web of Science, Scopus, Cochrane Library, Biblioteca Virtual em Saúde (LILACS e BBO), EMBASE; e na literatura cinzenta (Google Scholar e Trip Database) em Junho de 2020. Não houve restrições de idioma ou data de publicação. Após a identificação dos artigos, remoção de duplicatas e processo de seleção dos estudos, efetuou-se uma busca manual nas listas de referências de cada artigo incluído.

Ainda baseado nos critérios de elegibilidade, foram incluídos estudos experimentais e estudos clínicos randomizados e não randomizados que compararam a quantidade de LPS em canais radiculares infectados antes e depois do uso de hidróxido de cálcio.

Foram excluídos relatos de casos, séries de casos, revisões de literatura, editoriais, artigos de opinião, artigos técnicos, pesquisas, diretrizes, conferências, comentários e estudos com animais.

A busca e seleção dos estudos, bem como a extração de dados de interesse, foram realizadas de forma independente por dois dos autores (NRB e PN). Em caso de divergências entre os autores, foram realizadas reuniões de consenso com um especialista em revisões sistemáticas (LCM). Os seguintes dados foram extraídos: referências (título, autores, ano de publicação, localização geográfica), desenho do estudo, tamanho da amostra, faixa etária, sintomas, medicação intracanal e solução de irrigação utilizada e tempo de utilização da medicação intracanal.

Os mesmos autores (NRB e PN) avaliaram, de forma independente, a qualidade metodológica e o risco de viés de cada artigo de acordo com os critérios da ferramenta ROB-2, para analisar o risco de viés de estudos randomizados (RCTs) (Sterne et al., 2019); da ferramenta ROBINS-I, para avaliar o risco de viés de estudos não randomizados (n-RCTs) (Sterne et al., 2016); e, da ferramenta *Before-And-After,* para analisar os estudos experimentais (NHLBI, 2013).

A ferramenta da ROB-2 para estudos randomizados controlados foi usada de acordo com Sterne e col. (2019), considerando como domínios-chave o método de randomização, a geração de sequência aleatória, ocultação de alocação, relato seletivo e cegamento na avaliação de resultados. Considerando que o desfecho primário desta revisão foram diferenças nos níveis de LPS, que não é uma resposta centrada no paciente e, portanto, não suscetível a viés devido ao conhecimento do paciente sobre a substância química auxiliar e medicação intracanal usada durante o tratamento, o cegamento dos profissionais não foi considerado um domínio principal para o julgamento do risco de viés.

Os estudos foram classificados em relação ao risco de viés como: baixo risco, se for improvável que o viés plausível alterasse significativamente os resultados; risco incerto, viés plausível que levantou dúvidas sobre os resultados; ou alto risco, viés que enfraqueceu seriamente os resultados.

Já para os ensaios clínicos não randomizados, foi usada a versão 2016 da avaliação metodológica ROBINS-I (Sterne et al., 2016). Esta ferramenta inclui sete domínios: viés devido à confusão, à seleção de participantes no estudo, à classificação de intervenções, aos desvios de intervenções pretendidas, aos dados ausentes, às medições de resultados e à seleção do resultado relatado. Os dois primeiros domínios referem-se ao período pré-intervenção, o terceiro refere-se ao momento da intervenção e os quatro últimos referem-se ao período pós-intervenção. O risco de parcialidade dentro de cada domínio foi julgado respondendo às perguntas com “sim”, “provavelmente sim”, “provavelmente não” ou “não”. A resposta "sem informação" também foi registrada, nos casos necessários.

As categorias para julgamento de risco de parcialidade foram “baixo risco”, “risco moderado”, “risco sério” e ”risco crítico” de parcialidade. Além disso, a categoria "sem informação" foi usada quando não houve dados suficientes para uma conclusão.

Para avaliar a qualidade metodológica de estudos experimentais sem controle, a ferramenta *Before-And-After* foi modificada com base nas características dos estudos considerando os seguintes itens: (1) se a questão ou objetivo do estudo estava claramente estabelecido; (2) se os critérios de elegibilidade foram pré-especificados e claramente descritos; (3) se o cálculo do tamanho da amostra foi realizado; (4) se a intervenção foi claramente descrita e aplicada de forma consistente; (5) se as medidas de resultado foram pré-especificadas, claramente definidas, válidas, confiáveis e avaliadas de forma consistente; (6) se a taxa de acompanhamento foi de 80% ou mais;

(7) se a análise estatística foi realizada para avaliar as mudanças nas medidas de resultados antes e depois da intervenção e se os valores de P foram fornecidos para essas mudanças; (8) se múltiplas medidas foram adquiridas antes e depois da intervenção; (9) se os participantes eram representativos da população; e, (10) se todos os participantes elegíveis que preencheram os critérios de entrada foram inseridos.

Ao verificar os critérios para cada item, uma resposta de “sim”, “não”, “ND” (não pode ser determinado), “NA” (não aplicável) ou “NR” (não relatado) foi atribuída. Foram estabelecidas as seguintes categorias: “bom”, indicando baixo risco de viés para os artigos que obtiveram de 8 a 10 respostas “sim”; “razoável”, indicando risco moderado de viés para artigos que obtiveram 5 a 7 respostas “sim”; e “ruim”, indicando falta de informação e alto risco de viés para os artigos que obtiveram 1 a 4 respostas “sim”.

Para responder à questão se o cálculo do tamanho da amostra foi realizado, uma adaptação foi feita: os artigos que não relataram o cálculo do tamanho da amostra foram designados “NR” (não relatado), pois não foi possível determinar se a amostra era representativa da população. No entanto, para itens que não relataram um cálculo de tamanho de amostra e onde o tamanho da amostra foi inferior a 10 pacientes no grupo de interesse, o item foi classificado como “não”, porque este pequeno tamanho de amostra dificilmente seria representativo (NHLBI, 2013).

Como a intervenção foi feita em nível individual (apenas o dente com diagnóstico de necrose pulpar foi tratado), foram excluídas perguntas sobre se a intervenção foi conduzida em nível de grupo e se as pessoas que avaliaram os resultados estavam cegas para as exposições / intervenções dos participantes.

As metanálises foram realizadas usando o software Comprehensive Meta-Analysis v3 (Biostat, Inc., Englewood, NJ, EUA) para avaliar a redução média das LPS após o uso de $Ca(OH)_2$ como medicação intracanal (MIC) e o software MedCalc 18.2.1 (MedCalc Software BVBA, Ostend, Bélgica) para calcular a incidência de redução de LPS após o uso de $Ca(OH)_2$ como MIC.

Na primeira metanálise, foi considerada a média ou diferença média da LPS intracanal antes e após o uso de $Ca(OH)_2$ como MIC, e um coeficiente de correlação interpaciente de 0,5 foi assumido, uma vez que o paciente era seu próprio controle. Dois momentos de 'antes do uso de MIC' foram considerados: após o acesso endodôntico (antes do preparo químico mecânico, PQM) e após o PQM (imediatamente antes da MIC), na tentativa de isolar a influência do $Ca(OH)_2$ nos níveis de LPS. Uma vez que os dois momentos mostraram um valor numérico médio de LPS diferente, distintas metanálises foram realizadas. As análises foram subgrupadas de acordo com o veículo $Ca(OH)_2$ (com ou sem substância antimicrobiana) e a solução irrigante utilizada durante o PQM.

O tamanho do efeito combinado foi calculado pela diferença média padronizada (SMD), uma vez que o desfecho apresentou variações metodológicas entre os estudos.

Em uma segunda análise, o número de dentes com redução de LPS (incidência de redução) e o número total de dentes avaliados em cada estudo, para cada tipo de veículo de $Ca(OH)_2$, foram incluídos para calcular a prevalência combinada com 95% intervalo de confiança (IC). Os veículos (com e sem substância antimicrobiana) para a medicação à base de $Ca(OH)_2$ foram considerados separadamente e assim realizadas metanálises específicas para cada um desses desfechos.

Em todas as análises, a heterogeneidade foi avaliada por meio do teste I^2 e foi aplicado o modelo de efeito aleatório. Análises de sensibilidade foram realizadas para avaliar a influência dos estudos com algum risco de viés na significância do efeito.

A certeza das evidências obtida em cada metanálise foi avaliada através da aplicação das recomendações GRADE (*Grading Recommendations, Assessments, Development, and Evaluations*) utilizando o programa GRADEpro GDT (disponível em https://gradepro.org/; McMaster University, Hamilton, On, Canada and Evidence Prime, Inc., Hamilton, On, Canada), sendo categorizada como “alta”, “moderada”, “baixa” ou “muito baixa”. As avaliações foram realizadas por dois pesquisadores de forma independente (NRB e PN).

3.5 Terceiro estudo

O terceiro estudo consistiu em um estudo observacional transversal exploratório realizado através de questionário online auto aplicado veiculado por redes sociais e endereço eletrônico. O projeto da pesquisa foi submetido ao Comitê de Ética em Pesquisa da Universidade Federal do Rio de Janeiro / Hospital Universitário Clementino Fraga Filho (HUCFF) e aprovado sob o parecer de número 5.202.530: (Anexo A – página 125), antes do início do estudo. O estudo foi relatado de acordo com as recomendações do relatório *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) (Von Elm et al., 2007).

Visando o entendimento sobre a influência decorrente da pandemia de COVID-19 nos protocolos clínicos relacionados à terapia pulpar em dentes decíduos, o estudo foi realizado em três etapas: (1) elaboração e avaliação do questionário; (2) aplicação do questionário e (3) análise dos dados; (4) elaboração de artigo científico e (5) produção e envio do produto técnico.

Participantes e recrutamento

Os participantes foram especialistas em Odontopediatria de todo o Brasil contatados eletronicamente através de redes sociais (WhatsApp®, Instagram®, Facebook®, Twitter®) ou endereço eletrônico no período de novembro de 2021 a janeiro de 2022.

Todos foram informados sobre os objetivos da pesquisa, assim como dos seus benefícios e potenciais riscos, devendo concordar de modo livre em participar, através do aceite virtual do Termo de Consentimento Livre e Esclarecido (TCLE) (Apêndice 1 – página 143).

Os respondentes foram elegíveis caso atendessem aos seguintes critérios: a) aceitar o TCLE; b) possuir curso de especialização em Odontopediatria. Os respondentes não foram elegíveis caso: a) não aceitassem o TCLE; b) não atuassem no território nacional; c) não praticassem o exercício profissional; d) submetessem respostas parciais. Os respondentes foram avisados que seriam excluídos caso revogassem seu consentimento ou solicitassem sua remoção do estudo por qualquer motivo.

Cálculo amostral

A amostra foi estimada com base no total de odontopediatras atuantes no Brasil, de acordo com os dados disponíveis no site do Conselho Federal de Odontologia (CFO). Aplicando-se 99% de confiança e 5% de erro amostral, um número mínimo estimado seria de 407 odontopediatras.

Fase 1: Elaboração e avaliação do questionário

Foi elaborado um questionário eletrônico autoaplicável, baseado no estudo de Martinho & Griffin (2021), composto por perguntas abertas e fechadas divididas em 3 domínios (Apêndice 2 – página 148):

1) Informações profissionais – com a finalidade de detectar o perfil do profissional;

2) Gerenciamento de biossegurança – para avaliar as formas de biossegurança adotadas durante atendimento; e,

3) Protocolo endodôntico de atendimento antes, durante e após a pandemia – para avaliar se houve alteração na prática clínica endodôntica.

O questionário elaborado inicialmente foi aplicado eletronicamente a 10 especialistas, professores de Odontopediatria, para identificar quaisquer problemas na compreensão das perguntas ou do preenchimento. As respostas, sugestões e o relato dessa experiência foram analisados pelos pesquisadores responsáveis a fim de identificar necessidades de adequação. Após fazer ajustes relacionados ao conteúdo e redação das perguntas, a nova versão foi aplicada novamente aos mesmos profissionais 15 dias depois, quando o processo foi repetido, gerando o questionário final (Apêndice 2 – página 148).

Fase 2: Aplicação de questionário

O questionário foi veiculado eletronicamente através da Plataforma Survey Monkey® (https://pt.surveymonkey.com, São Francisco, Califórnia, EUA) disponibilizado à Odontopediatras de todo o Brasil através de link enviado pelas redes sociais WhatsApp Inc® (WhatsApp Inc. Menlo Park, Califórnia, EUA), Facebook Inc® (Facebook Inc. Menlo Park, Califórnia, EUA) e Instagram (Menlo Park, Califórnia, EUA) e preenchido pelo participante de pesquisa sem controle de tempo.

Foram disponibilizados aos participantes endereços de e-mail, rede social e telefones para contato com a equipe em caso de dúvidas ou esclarecimentos. Todas as solicitações foram prontamente atendidas.

Fase 3: Criação de vídeo e avaliação por especialistas

Paralelamente à realização da etapa anterior, foram desenvolvidas ferramentas informativas, na forma de vídeo, contendo textos explicativos, narração, animações e imagens em 2D sobre a técnica endodôntica não instrumental. O vídeo oferecia explicações detalhadas sobre a técnica, suas indicações, vantagens, bem como o seu passo a passo e o material necessário para a realização da mesma.

Concluída a elaboração, os vídeos foram avaliados pelo mesmo grupo descrito na Fase 1. Adequações julgadas pertinentes incluíram a diminuição do volume da música de fundo, acréscimo de marca d'água nas figuras e de setas explicativas para demonstrar a cavidade de medicação e a necrose pulpar. Os vídeos foram enviados individualmente aos participantes, através do e-mail informado no estudo. Além disso, esses materiais podem ser acessado através dos seguintes links: https://www.youtube.com/watch?v=YYvHyjNS8XM - Considerações iniciais e https://youtu.be/3nhvzH52RdM - Tática operatória.

Classificação hierárquica das cidades

As cidades onde se localizam as instituições de ensino nas quais os participantes se especializaram e aquelas em que atuam foram classificadas segundo a publicação Regiões de Influência Urbana em que o Instituto Brasileiro de Geografia Estatística (IBGE) analisou a hierarquia urbana (IBGE, 2020). Essa identificação é realizada por meio da classificação dos centros urbanos que possuem determinados equipamentos e serviços e que atraem populações de outras localidades e os classifica como: Metrópoles, Capitais Regionais, Centros Sub-Regionais, Centros de Zona ou Centros Locais.

Controle de viés

O endereço de e-mail dos participantes foi obtido para impedir que o questionário fosse respondido mais de uma vez pela mesma pessoa e para envio do vídeo informativo sobre a TENI. No entanto, no momento da tabulação dos dados, todos os endereços de e-mail foram excluídos para garantir o anonimato dos participantes.

Para reduzir o viés de seleção, além de estimar o tamanho amostral através de cálculo, a pesquisa foi conduzida na forma de censo e divulgada amplamente a fim de alcançar todos os Odontopediatras brasileiros.

Quanto ao processo de resposta, não foi estabelecido horário para preenchimento do questionário nem limite de tempo, além de ser auto aplicado, permitindo que os sujeitos o respondessem de forma tranquila, minimizando a chance de obter respostas apressadas e o viés de memória.

Ademais, para evitar o viés de sugestão, e permitir que os participantes pudessem registrar suas respostas livremente, os pesquisadores incluíram campo aberto para digitação nas questões em que consideraram pertinente.

Análise estatística

Os dados foram tabulados no programa Microsoft Excel (Microsoft Corporation, Redmond, WA, EUA) e realizaram-se análises descritivas das frequências e testes não-paramétricos de comparação para variáveis independentes. Utilizando o programa Jamovi Stats (Versão 1.6.23, Sydney, Austrália), considerando um nível de significância de 5%, realizaram-se os testes de McNemar (para 2 grupos) e de Friedman (para 3 ou mais grupos) para analisar os dados das amostras dependentes (antes e durante a pandemia), Kruskal-Wallis para comparar 3 ou mais grupos

independentes e teste Qui-Quadrado para comparações bivariadas, aplicando também o teste exato de Fisher quando adequado.

4. DESENVOLVIMENTO DA PESQUISA

Artigo 1: Worldwide trends and expectations in pulpectomy for primary teeth: a bibliometric review.

Artigo a ser enviado para o periódico "*International Journal of Paediatric Dentistry"*

Artigo 2: Does calcium hydroxide reduce endotoxins in infected root canals? Systematic review and meta-analysis

Artigo publicado no periódico *"Journal of Endodontics".*

Artigo 3: Influence of the COVID-19 pandemic on pulp therapy protocols in Pediatric Dentistry practice: an observational study

Artigo a ser enviado para o periódico "*International Journal of Paediatric Dentistry"*.

4.1 Artigo 1: Worldwide trends and expectations in pulpectomy for primary teeth: a bibliometric review.

Running Title: Worldwide trends in pulpectomy for primary teeth

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Abstract

Objective: To analyze studies of pulpectomy in primary teeth regarding the available bibliometric data and their main protocol-related characteristics. **Material and Methods:** Electronic searches were carried out on Scopus, Embase, PubMed, Web of Science, Cochrane and Lilacs/Virtual Health Library (VHL) using the terms “pulpectomy”, “root canal”, “child” and “preschool” in October 2021. Country, journals, main topic, tooth type, instrumentation protocols, irrigants, filling pastes and final restorations were analyzed in Vantage Point™. **Results:** From 3141 articles, 98 were included. India (n=38), Brazil (n=17), United States and Turkey (n=7) published the most on the topic. Journal of Indian Society of Pedodontics and Preventive Dentistry (n=15, IF=0.67) and Pediatric Dentistry (n=13, IF=1.594) were the journals with most publications. The main topic was root filling material (n=31). Most studies included posterior teeth (n=63), manual instrumentation (n=95), sodium hypochlorite as irrigant (n=65), zinc oxide/eugenol (ZOE) as filling paste (n=47) and stainless-steel crowns (n=61) as restoration. **Conclusion:** There is a general lack of multicentric clinical studies on pulpectomy procedures in primary teeth. Most of the studies were published in developing countries, revealing a clear bias on treatment options offered for children around the world, as access to general anesthesia (GA) services in developed countries lead to extraction of pulp affected teeth. Most studies reported the use of manual instrumentation with sodium hypochlorite as irrigation solution and filling with ZOE. A trend in scientific research for the use of mechanical instrumentation and more biocompatible and effective filling pastes was identified.

Keywords: root canal treatment; primary teeth; bibliometric analyses; clinical protocols; children.

Introduction

Dental trauma and dental caries are common problems in children, who frequently require pulp therapy to help retain their primary teeth in the arch until the transitional period [1,2]. The success of pulpectomy procedures is highly dependent on the correct pulp diagnosis, on the practitioner's comprehension of the internal morphology of primary teeth, and on the pulp therapy treatment chosen to manage the root canals and crown restorative techniques as well as suitable materials to enable sealing and prevent microleakage [1].

A wide variety of treatment protocols for pulpectomy in primary teeth are available in clinical practice [3]. Many studies have compared different instrumentation techniques [4,5], irrigants [6,7] and biocompatible root filling materials [8,9] which are nontoxic to periapical tissues [10]. However, there is still no agreement on materials or protocols [2]. Therefore, it may be useful to identify and analyze studies comparing the available materials and procedures for pulpectomy in primary teeth, supporting clinicians and researchers with an organized description of trends in this topic.

Conceivably, this bibliometric method to quantify the research production, author performance, and manuscript impact [11] may contribute to identify trends and gaps in knowledge related to clinical protocols for pulpectomy and help identify the real research needs in this area. The goal of this research was to perform a quantitative analysis of the clinical and observational articles concerning pulpectomy procedures in primary teeth and gather the available bibliometric data along with their protocol-related characteristics, in order to show the importance of this treatment for maintaining the children's well-being.

Materials and Methods

A search was performed to identify pulpectomy studies in primary teeth based on the specific research strategies for each database (Table 1) guided by an experienced librarian (DFM). The articles were searched using the terms “pulpectomy” OR “root canal” AND “child” OR “preschool” and their permutations in Medline/PubMed, Scopus, EMBASE, Web of Science, Cochrane Library and Lilacs/VHL electronic databases. No restrictions to the year of publication or language were applied and the searches were performed at October 2021. All articles retrieved in the search were analyzed in the Vantage Point™ (Search Technology, Inc., Florida, USA) software.

Eligibility Criteria

Inclusion criteria were clinical, prospective, or retrospective studies in nature with or without a control or a comparison group, in which one of the outcomes was the evaluation of the treatment protocols for pulpectomy in primary teeth. Animal studies, case reports, case series, *in vitro* and *ex vivo* studies, reviews, meta-analysis, and guidelines were not included.

Selection of studies

A table generated by VantagePoint™ was used to enable the three reviewers (NRB, MLD, MCS) to carry out the selection process individually, by assessing of the titles and abstracts of each study retrieved from the databases consistent with the eligibility criteria. The duplicates were removed manually. When the title and abstract did not offer sufficient data for a definitive decision about inclusion the full article was evaluated. All eligible articles were retrieved from the databases or by directly contacting the authors. The full text of papers that could not be obtained after five

attempts to contact the author by email was not included in this review. Any divergences concerning the eligibility of studies were solved through consensus, or with the assistance of two experienced researchers in bibliometric (AF) and pulpectomy (LGP) studies.

Bibliometric data collection

The bibliometric data extracted the most cited words in title and abstracts, the year of publication, the citation count, journals, authors, affiliations, institutions and country and these items were analyzed following specific parameters. The 20 most cited words in the title and abstract, excluding the words from the search strategy, were sorted, and mentioned in a word cloud. The year of publication of the articles was divided into decades (from the oldest to the most recent article that was included: 1985 - 2020). The citation count was defined based on Scopus and Google Scholar databases and only the articles that presented the same position on the citation ranking in the two databases were considered, and finally, regarding the journals, information about title, number of published articles (3 or more), impact factor according to the SCImago Journal Rank and their scope were the variables identified. Authors were classified according to the number of published articles (3 or more) they had published on the topic. The corresponding authors' address determined the institution and country of origin.

The study design was classified as interventional or observational. Interventional studies included clinical research comparing at least two intervention groups, while observational studies included retrospective observational studies relying on the dental records, with or without a control or a comparison group.

Data collection on the available clinical protocols for pulpectomy in primary teeth

The following data were collected from studies on pulpectomy protocols: tooth that was treated (anterior or posterior); method of instrumentation (manual and/or mechanical); irrigation substance used (NaOCl, saline, chlorhexidine, others or not reported); filling method (manual, mechanical or syringe obturation); type of filling paste (clustered by its principal components: iodoform paste, $Ca(OH)_2$ based paste, mixed paste, ZOE paste, other); material used to restore the crown; number of sessions and type of intracanal medication (if used). In addition, the categorization regarding the main topic of the article was made by three reviewers (NRB, MLD, MCS) based on the primary outcome of the study, namely: location of access point, working length measurement, instrumentation technique, irrigant solutions, intracanal medication, root canal filling technique, root filling material, crown restoration or comparison between different pulp therapies (when pulpectomy was compared with other treatments, i.e. pulpotomy). The articles which covered two or more topics related to the treatment protocol for pulpectomy were recorded repeatedly. Any disagreements regarding the classification by categories were resolved through consensus among the reviewers.

All these data were manually extracted by the researchers and analyzed in the Vantage Point™ (Search Technology, Inc., Florida, USA) software. If any of the referred variables was not described in the article, nor obtained after contacting the authors we classified the topic as "not reported".

Data analysis

Bibliometric data analyzes such as the correlation between authors and authors who published 3 or more articles and their published journals were carried out in the VantagePoint™ (Search Technology, Inc., Florida, USA) and Microsoft Office Excel 2010 (Microsoft®, USA). Frequency values (absolute and relative) were calculated for all variables.

Some descriptive analyses of protocol data in the same study could contain one or more classification options for the same variable. This would possibly create a greater frequency of these variables than the number of studies included.

Results

Initially, 4997 studies were identified in the searched databases where 1856 of them were duplicates and therefore eliminated. After evaluating the titles, abstracts, and full-texts, 98 articles were included (Figure 1) (Appendix 1). The references and citation data of the studies on Scopus and Google Scholar databases are presented in Table 2.

Bibliometric data

The 20 most cited words in the titles and abstracts are demonstrated in a word cloud (Figure 2), in which the majority were “primary teeth” and “primary molars”, appearing in 31 and 26 manuscripts, respectively. The most frequently cited words about filling materials for primary teeth were zinc oxide/eugenol (n=6), followed by Endoflas™ (n=4), calcium hydroxide (n=3) and Vitapex™ (n=3).

The included papers were published from 1985 to 2020. The citation count, according

to Scopus and Google Scholar is presented in Table 2. The citation count ranged from 0 to 219, in which the top 3 most cited manuscripts [12-14] were categorized in the topic “root filling material” and were published in pediatric dentistry journals. The most-cited article (n=219), by Mortazavi & Mesbahi (2004) [12], came out in the International Journal of Paediatric Dentistry and compared zinc oxide/eugenol (ZOE) with Vitapex as root filling materials for primary molars. The second most-cited (n=162) article, by Garcia-Godoy (1987) [13], studied the efficiency of an iodoform paste in root canal fillings of primary teeth. The third most-cited article (n=152), by Holan & Fuks (2004) [14] compared ZOE with KRI paste.

A total of 300 researchers contributed with articles on pulpectomy in primary teeth. In relation to the collaboration between authors, a greater correlation can be noted between researchers from the same institution and/or from the same country, with a clear absence of multicentric studies (Figure 3). Considering the authors with 3 or more publications, 14 authors entered the ranking, being Jeevanandan G at the top with 6 published papers, followed by Barcelos R and Primo LG, with 5 papers each, and Gleiser R and Subramanian EM, both with 4. Another nine authors published 3 manuscripts each (Figure 4). The Journal of Indian Society of Pedodontics and Preventive Dentistry (J Indian Soc Pedod Prev Dent) issued most articles by authors with 3 or more articles published, totaling 10 articles. Among the scientific journals with the highest number of papers on the topic of this review, 10 were pediatric dentistry journals; however, none of these were endodontic journals. A correlation between the top authors as well as the correlation between the top publishing authors and the journal of publication is shown in Figures 3 and 4, respectively.

The selected papers were from 16 different countries. A total of 38 studies were carried in India, followed by 17 in Brazil, 7 in the United States and Turkey, 6 in Iran, and 4 studies in Thailand and in Israel each (Figure 5). A total of sixty-seven institutions in these countries studied pulpectomy in primary teeth. Saveetha Dental College & Hospital, in India, contributed with 7 articles, followed by Universidade Federal do Rio de Janeiro (n=5), in Brazil, and Hebrew University (n=4) in Israel.

The 98 papers included in this review were published in 44 journals. J Indian Soc Pedod Prev Dent contributed with the greatest number of articles (n=15), followed by the Pediatric Dentistry (n=13), and International Journal of Paediatric Dentistry (n=8). These three journals published 79.5% of the articles selected for this review. Out of the 44 journals, 65.9% contributed only with a single article each. The oldest papers were from the second half of the 80s, but the majority was published between 2011 and 2020. The impact factor of the journals ranged from 0.06 to 6.369, and 9 (23.7%) of the 38 manuscripts conducted in India and 11 (64.7%) of the 17 Brazilian studies came out in scientific journals with an impact factor of 1.0 or higher.

Most articles (n = 57) were published in journals on Pediatric Dentistry, while 4 articles were published in Endodontic journals. The remaining articles included those that were published in journals about general dentistry (n=25), medical or biomedical sciences (n = 3), biochemistry, genetics and molecular biology (n=3), dental trauma (n=2), photodynamic therapy (n=1), cranial, facial and oral conditions (n=1), public health (n=1) and about drugs and medicines (n=1).

In relation to the type of study, 80 were classified as interventional and 18 as observational studies. The main topics of the articles were root filling materials (n=31), pulpectomy follow-ups without comparison groups (n=25) itself, instrumentation

technique (n=18), irrigant solutions (n=7), root canal filling technique (n=6), intracanal medication (n=5), restoration (n=2), working length measurement of root canal (n=1) and location of access point (n=1).

Protocol related data

Twenty three studies treated both anterior and posterior teeth, 12 anterior teeth and 62 treated posterior teeth. The type of instrumentation, irrigant solution, filling paste and restorative material studied per decade are shown in Figure 6. Manual instrumentation was the most used type of instrumentation (n=95), of which, 78 studies used only manual technique, 19 papers applied mechanical instrumentation whilst one paper did not report the type of instrumentation procedure used. Sodium hypochlorite was the most used irrigant solutions, followed by saline; however, 6 studies did not report the irrigation protocol used. The root canal filling pastes most commonly used were ZOE based pastes and mixed pastes, which were those combining calcium hydroxide associated with iodoform and other components[1], i.e. Vitapex®. As some studies used more than one root filling material, a cluster map in Figure 7 shows the distribution of filling pastes that were classified according to their more prevalent component, as follows: “ZOE pastes” (n=47); “Calcium hydroxide-based pastes” (n=14); “Iodoform pastes” (n=7); “Mixed pastes” (n=46); and “Other pastes” (n=13) for those that did not fit in any of the former groups.

There was no standardization regarding the number of sessions used to complete the pulpectomy procedure. The authors reported that the clinical symptoms of each case were the main factor in choosing more than one session to finish the procedure. However, most of the cases were conducted in a single appointment (n=81), while 27 reported a multi appointments approach. In this case, the intracanal medications were

calcium hydroxide (n=7), formocresol (n=6), camphorated paramonochlorophenol (n=4), modified calcium hydroxide (those which added chlorhexidine, camphorated paramonochlorophenol or propyleneglycol to $Ca(OH)_2$) (n=3), metronidazole (n=1), one with propolis (n=1) and one did not use any medication (n=1). Four studies did not report their multi appointment approach in their protocol. The most used restorative materials were stainless steel crowns (n=61), composite resins (n=36), followed by amalgam (n=11) and glass ionomer cements (n=10) (Figure 6).

Discussion

Bibliometric analysis is a quantitative method that aims to analyze academic literature by evaluating several features of the scientific articles, comprising the main journals published, number of citations received, study design and methodology, author information, affiliation, and collaborations [15,16]. As far as the authors know, this is the first article with a critical investigation based on bibliometric data for pulpectomy protocols in deciduous teeth.

Citation analysis aims to quantify the relevance of the study measured through the citation count [16]. The three (3) most cited papers addressed root filling materials and, although ZOE has been considered a reasonably safe material [17], the search clearly continues for biocompatible materials with properties that overcome the main drawbacks of ZOE: lower resorption rate than the primary tooth root [18] and retention of material remnants after exfoliation [9,19].

Furthermore, the top authors who have published articles on pulpectomy in primary teeth were mostly connected through their institutional research groups, with few associations between authors from different institutions.

This indicates that the lack of multicentric studies and a socioeconomic or cultural similarity between the participants involved in the research could be a limitation for understanding the outcomes of the therapies in different populations or extrapolating to other parts of the world.

Most articles were published in pediatric dental journals, whose impact factors tend to be smaller than endodontic journals. Indeed, only four were published in endodontic journals: one in the International Endodontic Journal, one in the Journal of Endodontics, one in the Iranian Endodontic Journal, and one in the Australian Endodontic Journal, which may suggest a lack of interest in endodontic journals regarding treatment of primary teeth. This may also reflect the general lack of interest in managing primary teeth endodontically in many countries, despite of its importance for the children's health, development, and quality of life [20].

In addition, this bibliometric analysis has shown that the majority of articles were carried out in developing countries, which may be related to a higher prevalence of pathological pulpal involvement caused by dental caries in these locations [21] but also the alarming rates of dental extractions under general anesthesia in developed countries [22]. In these locations, dental care pathways in children frequently involve general anesthesia (GA) sessions to guarantee quick resolution and a more “child friendly” dental treatment [22]. Under GA however, pulp therapy of primary teeth with pulp involvement is not routinely undertaken to avoid possible need of re-treatment and repeated GA sessions [23], which directs the treatment for extraction. This may be one of the reasons why pulpectomy in primary teeth is not so studied in developed countries, as shown in the bibliometric data presented in this study. This also raises an interesting question: extraction, despite being a resolutive treatment, does not solve

all problems. Teeth that are early extracted need a space maintainer to avoid loss of space and this generates an extra cost to the treatment that, most likely, is not considered at the time of initial planning of the case.

There are many techniques to promote instrumentation of root canals of primary teeth; however, they all aim at the complete cleansing of the canals to prevent any recurrence of bacterial contamination and to contribute to the success of the root canal treatment [3]. The outcomes of the current research disclosed that manual files were the most common instrumentation used along the period studied, however, the use of rotary instrumentation has increased in the last decade, showing a trend towards treatments with reduced chair time. It is important to note that some studies comparing rotary versus manual instrumentation disclosed no difference in terms of clinical success [4,5]. However, despite rotary instrumentation being a faster technique [3], it has also a higher cost, which may still hinder its use.

Irrigant solutions are essential to achieve successful debridement and disinfection of the root canal system [6,7]. Irrigants currently represent the best method in pediatric pulpectomy to dislodge the suspended debris from the root canal during instrumentation [6,7]. Various different irrigant solutions such as hydrogen peroxide, 2% chlorhexidine gluconate (CHX), sodium hypochlorite (NaOCl), citric acid and 17% EDTA have been suggested for chemo-mechanical preparation [7]. A recent systematic review showed no difference in the performance of pulpectomies when chlorhexidine, 1% or 5% sodium hypochlorite or sterile water/saline were used as irrigant solution [3]. Although it is controversial whether NaOCl is able to remove or not the smear layer, it remains as the most commonly used irrigant for primary teeth [24], which is in accordance with the results of our bibliometric analysis.

Following chemo-mechanical preparation, root canal filling is performed with a resorbable biocompatible material, e.g. iodoform-based paste [13], a combination paste of iodoform and calcium hydroxide [25] or zinc/oxide eugenol [12,14]. Our study showed that a wide variety of materials are used (ZOE, iodoform pastes, calcium hydroxide based and mixed pastes), which evidenced the trend of a continuing search for a material with improved properties. In most cases, the choice is based on the clinician's discretion [2]. Previous systematic reviews did not show statistically significant differences in the frequency of radiographic and clinical success of calcium hydroxide / iodoform compared to ZOE / iodoform based pastes combined with calcium hydroxide, ZOE / iodoform and the solely use of ZOE used in primary tooth pulpectomy in an 18-month follow-up period [2,26].

Pulpectomy aims to eliminate microorganisms and prevent reinfection in infected deciduous tooth. However, this cannot always be achieved in a single session. Multiple pulpectomy visits involve extirpation of the infected pulp and application of intracanal medicament, usually performed when the bleeding does not cease or there is suppuration. The purpose of this inter appointment dressing is to help reduce the remaining microorganisms [27]. A study in primary dentition has shown that calcium hydroxide cannot completely eliminate bacteria from root canals and in some cases allows recontamination [29]. Yet, due to the questionable characteristics of other medications, $Ca(OH)_2$ remains the most used, corroborating with our analysis. Coll et al. (2020) [3] concluded that the number of appointments does not interfere in the success rates of pulpectomy, nevertheless, it should be taken into consideration that in pulpectomy treatments with multiple visits, the patient needs to be subjected to local anesthesia and rubber dam isolation at all times, increasing the cost of treatment and the child's stress [30].

After a pulpectomy procedure, the tooth must be repaired with a material which is able to provide adequate sealing preventing micro leakage. According to the AAPD (2020) [1] and the National Guidelines on Pediatric Dentistry in the United Kingdom [30], the clinician must decide on the material and when to perform the restoration based on clinical experience, choosing materials that allow the sealing of the teeth, and preventing bacterial contamination. According to our analysis, the use of resin and stainless steel crowns has increased over the past decade. Although crowns have higher long-term success rates [3], we need to consider that presently they are not always available in every country. However, considering that a good restoration is the one that prevents microleakage [3], composite resin restorations in primary teeth can be an excellent alternative.

Although there is still no consensus on the best technique, it was possible to see that there is a general knowledge of which protocols and materials should be used. In addition, there has been an increase in research on pulp therapy protocols in the last decade, showing a need for better results e new techniques.

Additionally, it is interesting to note that most published studies on pulpectomy only address the clinical and radiographic success rates, but rarely report on the disadvantages of the technique, such as child stress and procedure time, which may suggest the lack of studies that measure psychometric issues involving children such as pain perception, dental anxiety and psychological stress. Interestingly, we could also note that no study that assessed cost-effectiveness was retrieved.

Another point to be discussed is that, as factors such as tooth type, instrumentation, irrigation, filling pastes and periodicity of follow-up appointments were heterogeneous, it was difficult to make comparisons among the studies. Furthermore, some studies

did not provide complete information regarding the pulp therapy protocol used. As all these factors may affect the outcome of the treatment, trial reports should describe all the details of the protocol. In this sense, adherence to guidelines may help ensure better reporting.

Conclusion

There is a general lack of multicentric clinical studies on pulpectomy procedures in primary teeth. Most studies were published in developing countries, revealing a clear bias in the treatment options offered to children worldwide, as wide access to GA services for dentistry is only available in developed countries. Most surveys have reported the use of manual instrumentation with sodium hypochlorite as an irrigation solution and zinc oxide/eugenol as filling. A tendency of scientific research to employ mechanical instrumentation and more biocompatible and effective filling pastes was identified.

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21. Gimenez T, Bispo BA, Souza DP, Viganó ME, Wanderley MT, Mendes FM, Bönecker M, Braga MM. Does the Decline in Caries Prevalence of Latin American and Caribbean Children Continue in the New Century? Evidence from Systematic Review with Meta-Analysis. *PLoS One*. 2016;11(10):e0164903.

22. Schrijvers G, van Hoorn A, Huiskes N. The care pathway: concepts and theories: an introduction. *Int J Integr Care*. 2012;12(Spec Ed Integrated Care Pathways):e192. Published 2012 Sep 18.

23. Ashley PF, Williams CE, Moles DR, Parry J. Sedation versus general anesthesia for provision of dental treatment to patients younger than 18 years. *Cochrane Database Syst Rev*. 2015;2015(9):CD006334.

24. Gonçalves LS, Rodrigues RC, Andrade Junior CV, Soares RG, Vettore MV. The Effect of Sodium Hypochlorite and Chlorhexidine as Irrigant Solutions for Root Canal Disinfection: A Systematic Review of Clinical Trials. *J Endod.* 2016;42(4):527-532

25. Ozalp N, Saroğlu I, Sönmez H. Evaluation of various root canal filling materials in primary molar pulpectomies: An in vivo study. *Am J Dent.* 2005;18(6):347-350.

26. Najjar RS, Alamoudi NM, El-Housseiny AA, Al Tuwirqi AA, Sabbagh HJ. A comparison of calcium hydroxide/iodoform paste and zinc oxide eugenol as root filling materials for pulpectomy in primary teeth: A systematic review and meta-analysis. *Clin Exp Dent Res*. 2019;5(3):294-310.

27. Chong BS, Pitt Ford TR. The role of intracanal medication n root canal treatment. *Int Endodon J.* 1992;25:97-106

28. Ito IY, Junior FM, et al. Microbial culture and checkerboard DNA– DNA hybridization assessment of bacteria in root canals of primary teeth pre- and post-

endodontic therapy with a calcium hydroxide/ chlorhexidine paste. *Int J Paediatr Dent.* 2011;21(5):353–360.

29. Tirupathi SP, Krishna N, Rajasekhar S, Nuvvula S. Clinical Efficacy of Single-visit Pulpectomy over Multiple-visit Pulpectomy in Primary Teeth: A Systematic Review. *Int J Clin Pediatr Dent.* 2019;12(5):453-459.

30. Rodd HD, Waterhouse PJ, Fuks AB, Fayle SA & Moffat MA. UK National Guidelines in Paediatric Dentistry: Pulp therapy for primary molars. *Int J Paediatr Dent*. 2006;16 Suppl 1:15-23.

Table 1 - Search Strategies

Database	Search strategies
PubMed	(((pulpectomy[MeSH Terms]) OR (pulpectom*[Title/Abstract])) OR (root canal*[Title/Abstract])) AND (((((((child[MeSH Terms]) OR (child*[Title/Abstract])) OR (toddler*[Title/Abstract])) OR (infant*[Title/Abstract])) OR (youth[Title/Abstract])) OR (child, preschool[MeSH Terms])) OR (preschool*[Title/Abstract]))
Scopus	((TITLE-ABS-KEY (pulpectom*)) OR (TITLE-ABS-KEY ("root canal*"))) AND ((TITLE-ABS-KEY (child*)) OR (TITLE-ABS-KEY (infant*)) OR (TITLE-ABS-KEY (youth)) OR (TITLE-ABS-KEY (toddler*)) OR (TITLE-ABS-KEY (preschool*)))
EMBASE	child*:ab,ti OR 'child, preschool':ab,ti OR preschool*:ab,ti OR infant*:ab,ti OR youth:ab,ti OR toddler*:ab,ti AND pulpectom*:ab,ti OR 'root canal*':ab,ti
Web of Science	((child* OR infant* OR toddler* OR youth OR preschool*)) AND ((pulpectom* OR root canal*))
Cochrane Library	#1 MeSH descriptor: [Pulpectomy] explode all trees #2 (pulpectom*):ti,ab,kw #3 (Root canal*):ti,ab,kw #4 #1 OR #2 OR #3 #5 MeSH descriptor: [Child] explode all trees #6 (CHILD*):ti,ab,kw #7 MeSH descriptor: [Child, Preschool] explode all trees #8 (preschool*):ti,ab,kw #9 MeSH descriptor: [Adolescent] explode all trees #10 (Adolescent*):ti,ab,kw #11 (TODDLER*):ti,ab,kw #12 (Infant*):ti,ab,kw #13 #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR#12 #14 #4 AND #13
BVS	(tw:((tw:(child*)) OR (tw:(criança)) OR (tw:(infant*)) OR (tw:(toddler*)) OR (tw:(youth)) OR (tw:(child, preschool)) OR (tw:(preschool*)))) AND (tw:((tw:(pulpectom*)) OR (tw:(pulpectomia)) OR (tw:(root canal*)))) AND (instance:"regional") AND (db:("BBO" OR "LILACS") AND type:("article"))

Table 2 - Included papers ranked by citation count.

Rank	Paper	Scopus	Google Schoolar
1	Mortazavi M, Mesbahi M. Comparison of zinc oxide and eugenol, and Vitapex for root canal treatment of necrotic primary teeth. Int J Paediatr Dent. 2004 Nov;14(6):417-424. doi: 10.1111/j.1365-263X.2004.00544.x. PMID: 15525310.	94	219
2	Holan G, Fuks AB. A comparison of pulpectomies using ZOE and KRI paste in primary molars: a retrospective study. Pediatr Dent. 1993 Nov-Dec;15(6):403-407. PMID: 8153002.	77	152
3	Garcia-Godoy F. Evaluation of an iodoform paste in root canal therapy for infected primary teeth. ASDC J Dent Child. 1987 Jan-Feb;54(1):30-4. PMID: 3468139.	60	162
4	Moskovitz M, Sammara E, Holan G. Success rate of root canal treatment in primary molars. J Dent. 2005 Jan;33(1):41-47. doi: 10.1016/j.jdent.2004.07.009. PMID: 15652167.	57	128
5	Ozalp N, Saroğlu I, Sönmez H. Evaluation of various root canal filling materials in primary molar pulpectomies: an in vivo study. Am J Dent. 2005 Dec;18(6):347-350. PMID: 16433405.	53	115
6	Trairatvorakul C, Chunlasikaiwan S. Success of pulpectomy with zinc oxide-eugenol vs calcium hydroxide/iodoform paste in primary molars: a clinical study. Pediatr Dent. 2008 Jul-Aug;30(4):303-308. PMID: 18767509.	53	103
7	Jeevanandan G, Govindaraju L. Clinical comparison of Kedo-S paediatric rotary files vs manual instrumentation for root canal preparation in primary molars: a double blinded randomised clinical trial. Eur Arch Paediatr Dent. 2018 Aug;19(4):273-278. doi: 10.1007/s40368-018-0356-6. Epub 2018 Jul 12. PMID: 30003514.	51	23
8	Nurko C, Garcia-Godoy F. Evaluation of a calcium hydroxide/iodoform paste (Vitapex) in root canal therapy for primary teeth. J Clin Pediatr Dent. 1999 Summer;23(4):289-294. PMID: 10551129.	50	145

9	Nakornchai S, Banditsing P, Visetratana N. Clinical evaluation of 3Mix and Vitapex as treatment options for pulpally involved primary molars. Int J Paediatr Dent. 2010 May;20(3):214-221. doi: 10.1111/j.1365-263X.2010.01044.x. PMID: 20409203.	47	117
10	Panchal V, Jeevanandan G, Subramanian E. Comparison of instrumentation time and obturation quality between hand K-file, H-files, and rotary Kedo-S in root canal treatment of primary teeth: A randomized controlled trial. J Indian Soc Pedod Prev Dent. 2019 Jan-Mar;37(1):75-79. doi: 10.4103/JISPPD.JISPPD_72_18. PMID: 30804311.	46	16
11	Fuks AB, Eidelman E, Pauker N. Root fillings with Endoflas in primary teeth: a retrospective study. J Clin Pediatr Dent. 2002 Fall;27(1):41-45. doi: 10.17796/jcpd.27.1.pp237453707386m1. PMID: 12413171.	41	88
12	Barr ES, Flatiz CM, Hicks MJ. A retrospective radiographic evaluation of primary molar pulpectomies. Pediatr Dent. 1991 Jan-Feb;13(1):4-9. PMID: 1945984.	40	104
13	Mani SA, Chawla HS, Tewari A, Goyal A. Evaluation of calcium hydroxide and zinc oxide eugenol as root canal filling materials in primary teeth. ASDC J Dent Child. 2000 Mar-Apr;67(2):142-147, 83. PMID: 10826052.	40	NE
14	Casas MJ, Kenny DJ, Johnston DH, Judd PL. Long-term outcomes of primary molar ferric sulfate pulpotomy and root canal therapy. Pediatr Dent. 2004 Jan-Feb;26(1):44-48. PMID: 15080357.	38	95
15	Thomas AM, Chandra S, Chandra S, Pandey RK. Elimination of infection in pulpectomized deciduous teeth: a short-term study using iodoform paste. J Endod. 1994 May;20(5):233-235. doi: 10.1016/S0099-2399(06)80284-0. PMID: 7931014.	37	107
16	Govindaraju L, Jeevanandan G, Subramanian E. Clinical Evaluation of Quality of Obturation and Instrumentation Time using Two Modified Rotary File Systems with Manual Instrumentation in Primary Teeth. J Clin Diagn Res. 2017 Sep;11(9):ZC55-ZC58. doi: 10.7860/JCDR/2017/30069.10602. Epub 2017 Sep 1. PMID: 29207834; PMCID: PMC5713856.	36	23
17	Ramar K, Mungara J. Clinical and radiographic evaluation of pulpectomies using three root canal filling materials: an in-vivo study. J Indian Soc Pedod Prev Dent. 2010 Jan-Mar;28(1):25-29. doi: 10.4103/0970-4388.60481. PMID: 20215668.	34	69
18	Coll JA, Josell S, Casper JS. Evaluation of a one-appointment formocresol pulpectomy technique for primary molars. Pediatr Dent. 1985 Jun;7(2):123-129. PMID: 3859843.	33	73

19	Bawazir OA, Salama FS. Clinical evaluation of root canal obturation methods in primary teeth. Pediatr Dent. 2006 Jan-Feb;28(1):39-47. PMID: 16615374.	32	77
20	Primosch RE, Ahmadi A, Setzer B, Guelmann M. A retrospective assessment of zinc oxide-eugenol pulpectomies in vital maxillary primary incisors successfully restored with composite resin crowns. Pediatr Dent. 2005 Nov-Dec;27(6):470-477. PMID: 16532887.	27	57
21	Barcelos R, Tannure PN, Gleiser R, Luiz RR, Primo LG. The influence of smear layer removal on primary tooth pulpectomy outcome: a 24-month, double-blind, randomized, and controlled clinical trial evaluation. Int J Paediatr Dent. 2012 Sep;22(5):369-381. doi: 10.1111/j.1365-263X.2011.01210.x. Epub 2011 Dec 29. PMID: 22221174.	27	41
22	Reddy VV, Fernandes. Clinical and radiological evaluation of zinc oxide-eugenol and Maisto's paste as obturating materials in infected primary teeth--nine months study. J Indian Soc Pedod Prev Dent. 1996 Jun;14(2):39-44. PMID: 9522755.	24	38
23	Ochoa-Romero T, Mendez-Gonzalez V, Flores-Reyes H, Pozos-Guillen AJ. Comparison between rotary and manual techniques on duration of instrumentation and obturation times in primary teeth. J Clin Pediatr Dent. 2011 Summer;35(4):359-363. doi: 10.17796/jcpd.35.4.8k013k21t39245n8. PMID: 22046692.	24	NE
24	Subramaniam P, Gilhotra K. Endoflas, zinc oxide eugenol and metapex as root canal filling materials in primary molars--a comparative clinical study. J Clin Pediatr Dent. 2011 Summer;35(4):365-369. doi: 10.17796/jcpd.35.4.1377v06621143233. PMID: 22046693.	24	52
25	Coll JA, Josell S, Nassof S, Shelton P, Richards MA. An evaluation of pulpal therapy in primary incisors. Pediatr Dent. 1988 Sep;10(3):178-184. PMID: 3268802.	21	47
26	Sari S, Okte Z. Success rate of Sealapex in root canal treatment for primary teeth: 3-year follow-up. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008 Apr;105(4):e93-96. doi: 10.1016/j.tripleo.2007.12.014. PMID: 18329574.	21	45
27	Gupta S, Das G. Clinical and radiographic evaluation of zinc oxide eugenol and metapex in root canal treatment of primary teeth. J Indian Soc Pedod Prev Dent. 2011 Jul-Sep;29(3):222-228. doi: 10.4103/0970-4388.85829. PMID: 21985878.	20	42
28	Rocha MJ, Cardoso M. Federal University of Santa Catarina endodontic treatment of traumatized primary teeth - part 2. Dent Traumatol. 2004 Dec;20(6):314-326. doi: 10.1111/j.1600-9657.2004.00261.x. PMID: 15522053.	20	34

29	Rewal N, Thakur AS, Sachdev V, Mahajan N. Comparison of endoflas and zinc oxide eugenol as root canal filling materials in primary dentition. J Indian Soc Pedod Prev Dent. 2014 Oct-Dec;32(4):317-321. doi: 10.4103/0970-4388.140958. PMID: 25231040.	18	31
30	Gondim JO, Avaca-Crusca JS, Valentini SR, Zanelli CF, Spolidorio DM, Giro EM. Effect of a calcium hydroxide/chlorhexidine paste as intracanal dressing in human primary teeth with necrotic pulp against Porphyromonas gingivalis and Enterococcus faecalis. Int J Paediatr Dent. 2012 Mar;22(2):116-124. doi: 10.1111/j.1365-263X.2011.01174.x. Epub 2011 Aug 24. PMID: 21883559.	18	37
31	Chawla HS, Setia S, Gupta N, Gauba K, Goyal A. Evaluation of a mixture of zinc oxide, calcium hydroxide, and sodium fluoride as a new root canal filling material for primary teeth. J Indian Soc Pedod Prev Dent. 2008 Jun;26(2):53-58. doi: 10.4103/0970-4388.41616. PMID: 18603728.	18	45
32	Panchal V, Jeevanandan G, Subramanian EMG. Comparison of post-operative pain after root canal instrumentation with hand K-files, H-files and rotary Kedo-S files in primary teeth: a randomised clinical trial. Eur Arch Paediatr Dent. 2019 Oct;20(5):467-472. doi: 10.1007/s40368-019-00429-5. Epub 2019 Mar 12. PMID: 30864090.	17	4
33	Tannure PN, Azevedo CP, Barcelos R, Gleiser R, Primo LG. Long-term outcomes of primary tooth pulpectomy with and without smear layer removal: a randomized split-mouth clinical trial. Pediatr Dent. 2011 Jul-Aug;33(4):316-320. PMID: 21902998.	14	24
34	Pramila R, Muthu MS, Deepa G, Farzan JM, Rodrigues SJ. Pulpectomies in primary mandibular molars: a comparison of outcomes using three root filling materials. Int Endod J. 2016 May;49(5):413-421. doi: 10.1111/iej.12478. Epub 2015 Jul 4. PMID: 26059708.	14	32
35	Makarem A, Ravandeh N, Ebrahimi M. Radiographic assessment and chair time of rotary instruments in the pulpectomy of primary second molar teeth: a randomized controlled clinical trial. J Dent Res Dent Clin Dent Prospects. 2014 Spring;8(2):84-89. doi: 10.5681/joddd.2014.015. Epub 2014 Jun 11. PMID: 25093051; PMCID: PMC4120910.	14	32
36	Bhandari SK; Anita, Prajapati U. Root canal obturation of primary teeth: disposable injection technique. J Indian Soc Pedod Prev Dent. 2012 Jan-Mar;30(1):13-18. doi: 10.4103/0970-4388.95566. PMID: 22565512.	14	22
37	Aminabadi NA, Farahani RM, Gajan EB. A clinical study of formocresol pulpotomy versus root canal therapy of vital primary incisors. J Clin Pediatr Dent. 2008 Spring;32(3):211-214. doi: 10.17796/jcpd.32.3.ghk26v4554790074. PMID: 18524271.	12	20

38	Moskovitz M, Tickotsky N, Ashkar H, Holan G. Degree of root resorption after root canal treatment with iodoform-containing filling material in primary molars. Quintessence Int. 2012 May;43(5):361-368. PMID: 22536587.	10	20
39	Chandra SP, Chandrasekhar R, Uloopi KS, Vinay C, Kumar NM. Success of root fillings with zinc oxide-ozonated oil in primary molars: preliminary results. Eur Arch Paediatr Dent. 2014 Jun;15(3):191-195. doi: 10.1007/s40368-013-0094-8. Epub 2013 Nov 6. PMID: 24197970.	10	16
40	Al-Ostwani AO, Al-Monaqel BM, Al-Tinawi MK. A clinical and radiographic study of four different root canal fillings in primary molars. J Indian Soc Pedod Prev Dent. 2016 Jan-Mar;34(1):55-59. doi: 10.4103/0970-4388.175515. PMID: 26838149.	9	16
41	Brustolin JP, Mariath AAS, Ardenghi TM, Casagrande L. Survival and Factors Associated with Failure of Pulpectomies Performed in Primary Teeth by Dental Students. Braz Dent J. 2017;28(1):121-128. doi:10.1590 /0103-6440201601009	9	16
42	Pinto DN, de Sousa DL, Araújo RB, Moreira-Neto JJ. Eighteen-month clinical and radiographic evaluation of two root canal-filling materials in primary teeth with pulp necrosis secondary to trauma. Dent Traumatol. 2011 Jun;27(3):221-224. doi: 10.1111/j.1600-9657.2011.00978.x. Epub 2011 Feb 23. PMID: 21342437.	8	21
43	Topçuoğlu G, Topçuoğlu HS, Delikan E, Aydınbelge M, Dogan S. Postoperative Pain After Root Canal Preparation with Hand and Rotary Files in Primary Molar Teeth. Pediatr Dent. 2017 May 15;39(3):192-196. PMID: 28583242.	8	13
44	Chen X, Liu X, Zhong J. Clinical and radiographic evaluation of pulpectomy in primary teeth: a 18-months clinical randomized controlled trial. Head Face Med. 2017 Oct 27;13(1):12. doi: 10.1186/s13005-017-0145-1. PMID: 29073902; PMCID: PMC5658955.	7	11
45	Zulfikaroglu BT, Atac AS, Cehreli ZC. Clinical performance of Class II adhesive restorations in pulpectomized primary molars: 12-month results. J Dent Child (Chic). 2008 Jan-Apr;75(1):33-43. PMID: 18505646.	7	26
46	Khubchandani M, Baliga MS, Rawlani SS, Rawlani SM, Khubchandani KM, Thosar N. Comparative evaluation of different obturation techniques in primary molars: An in vivo study. Eur J Gen Dent. 2017;6:42-47. doi: 10.4103/2278-9626.198611	7	6
47	Coser RM, Gondim JO, Aparecida Giro EM. Evaluation of 2 endodontic techniques used to treat human primary molars with furcation radiolucency area: A 48-month radiographic study. Quintessence Int. 2008 Jul-Aug;39(7):549-557. PMID: 19107262.	7	18

48	Bharuka SB, Mandroli PS. Single- versus two-visit pulpectomy treatment in primary teeth with apical periodontitis: A double-blind, parallel group, randomized controlled trial. J Indian Soc Pedod Prev Dent. 2016 Oct-Dec;34(4):383-390. doi: 10.4103/0970-4388.191429. PMID: 27681404.	7	18
49	Arikan V, Sonmez H, Sari S. Comparison of Two Base Materials Regarding Their Effect on Root Canal Treatment Success in Primary Molars with Furcation Lesions. BioMed Res Int. 2016;2016:1429286. doi: 10.1155/2016/1429286	6	8
50	Sevekar SA, Gowda SHN. Postoperative Pain and Flare-Ups: Comparison of Incidence Between Single and Multiple Visit Pulpectomy in Primary Molars. J Clin Diagn Res. 2017 Mar;11(3):ZC09-ZC12. doi: 10.7860/JCDR/2017/22662.9377. Epub 2017 Mar 1. PMID: 28511499; PMCID: PMC5427425.	6	15
51	Howley B, Seale NS, McWhorter AG, Kerins C, Boozer KB, Lindsey D. Pulpotomy versus pulpectomy for carious vital primary incisors: randomized controlled trial. Pediatr Dent. 2012 Sep-Oct;34(5):112-119. PMID: 23211895.	6	19
52	Mendoza AM, Reina JE, Garcia-Godoy F. Evolution and prognosis of necrotic primary teeth after pulpectomy. Am J Dent. 2010 Oct;23(5):265-268. PMID: 21207793.	5	16
53	Guler C, Gurbuz T, Yilmaz Y. The clinical success of different root canal treatments in primary molars. Cumhuriyet Dent J. 2013;16(1):31-39. doi: 10.7126/cdj.2012.1607	5	11
54	Mokhtari N, Shirazi A, Ebrahimi M. A smart rotary technique versus conventional pulpectomy for primary teeth: A randomized controlled clinical study. J Clin Exp Dent. 2017;9(11):e1292-e1296. Published 2017 Nov 1. doi:10.4317/jced.53968	4	7
55	Lima RA, Carvalho CB, Ribeiro TR, Fonteles CS. Antimicrobial efficacy of chlorhexidine and calcium hydroxide/camphorated paramonochlorophenol on infected primary molars: a split-mouth randomized clinical trial. Quintessence Int. 2013 Feb;44(2):113-122. doi: 10.3290/j.qi.a28932. PMID: 23444177.	4	17
56	Nguyen TD, Judd PL, Barrett EJ, Sidhu N, Casas MJ. Comparison of Ferric Sulfate Combined Mineral Trioxide Aggregate Pulpotomy and Zinc Oxide Eugenol Pulpectomy of Primary Maxillary Incisors: An 18-month Randomized, Controlled Trial. Pediatr Dent. 2017 Jan 15;39(1):34-38. PMID: 28292339.	4	6
57	Kargül B, Tanboga I, Altinok B. Conventional endodontic treatment of primary molars using metronidazole as an intra-canal medicament: a pilot study. Eur Arch Paediatr Dent. 2010 Aug;11(4):196-200. doi: 10.1007/BF03262744. PMID: 20840831.	4	7

58	Cassol DV, Duarte ML, Pintor AVB, Barcelos R, Primo LG. Iodoform Vs Calcium Hydroxide/Zinc Oxide based pastes: 12-month findings of a Randomized Controlled Trial. Braz Oral Res. 2019;33:e002. doi: 10.1590/1807-3107 bor-2019.vol33.0002.	4	10
59	Pandranki J, Chitturi RR, Vanga NR, Chandrabhatla SK. A comparative assessment of different techniques for obturation with endoflas in primary molars: An In vivo Study. Indian J Dent Res. 2017 Jan-Feb;28(1):44-48. doi: 10.4103/ijdr.IJDR_507_16. PMID: 28393816.	3	4
60	Cancio V, Carvalho Ferreira D, Cavalcante FS, Rosado AS, Teixeira LM, Braga Oliveira Q, Barcelos R, Gleiser R, Santos HF, Dos Santos KRN, Primo LG. Can the Enterococcus faecalis identified in the root canals of primary teeth be a cause of failure of endodontic treatment? Acta Odontol Scand. 2017 Aug;75(6):423-428. doi: 10.1080/00016357.2017.1328742. Epub 2017 Jun 5. PMID: 28580816.	3	8
61	Gandhi M, Tandon S, Vijay A, Kalia G, Rathore K. Clinical Assessment of Various Obturating Techniques for Primary Teeth: A Comparative Study. J Clin Diagn Res. 2017;11(7): ZC48-ZC51. doi: 10.7860/JCDR/2017/25818.10194	3	7
62	Doneria D, Thakur S, Singhal P, Chauhan D, Keshav K, Uppal A. In Search of a Novel Substitute: Clinical and Radiological Success of Lesion Sterilization and Tissue Repair with Modified 3Mix-MP Antibiotic Paste and Conventional Pulpectomy for Primary Molars with Pulp Involvement with 18 Months Follow-up. Contemp Clin Dent. 2017 Oct-Dec;8(4):514-521. doi: 10.4103/ccd.ccd_47_17. PMID: 29326499; PMCID: PMC5754969.	3	3
63	Morankar R, Goyal A, Gauba K, Kapur A, Bhatia SK. Manual versus rotary instrumentation for primary molar pulpectomies- A 24 months randomized clinical trial. Pediatr Dent J. 2018;28(2):96-100. doi: 10.1016/j.pdj.2018.02.002	3	8
64	Duanduan A, Sirimaharaj V, Chompu-inwai P. Retrospective Study of Pulpectomy with Vitapex® and LSTR with Three Antibiotics Combination (3Mix) for Non-Vital Pulp Treatment in Primary Teeth. CMU J Nat Sci. 2013;12(2):131-139. doi: 10.12982/CMUJNS.2013.0012	3	6
65	Mendoza-Mendoza A, Caleza-Jiménez C, Solano-Mendoza B, Iglesias-Linares A. Are there any differences between first and second primary molar pulpectomy prognoses? A retrospective clinical study. Eur J Paediatr Dent. 2017 Mar;18(1):41-44. doi: 10.23804/ejpd.2017.18.01.09. PMID: 28494602.	2	3
66	Singh R, Barua P, Kumar M, Safaya R, Monajemi H, Monajemi H. Effect of Ultrasonic Instrumentation in Treatment of Primary Molars. J Contemp Dent Pract. 2017 Sep 1;18(9):750-753. doi: 10.5005/jp-journals-10024-2120. PMID: 28874635.	2	4

67	Chandrasekhar S, Prasad MG, Radhakrishna AN, Saujanya K, Raviteja NVK, Deepthi B, Ramakrishna J. A comparative In vivo efficacy of three spiral techniques versus incremental technique in obturating primary teeth. J Indian Soc Pedod Prev Dent. 2018 Jan-Mar;36(1):71-75. doi: 10.4103/JISPPD.JISPPD_365_16. PMID: 29607843.	1	3
68	Elheeny AAH. Allium sativum extract as an irrigant in pulpectomy of primary molars: A 12-month short-term evaluation. Clin Exp Dent Res. 2019 Jun 26;5(4):420-426. doi: 10.1002/cre2.197. PMID: 31452953; PMCID: PMC6704030.	1	1
69	Damle SG, Nadkarni UM. Calcium hydroxide and zinc oxide eugenol as root canal filling materials in primary molars: a comparative study. Aust Endod J. 2005 Dec;31(3):114-119. doi: 10.1111/j.1747-4477.2005.tb00318.x. PMID: 16392734.	1	9
70	Doneria D, Thakur S, Singhal P, Chauhan D. Comparative evaluation of clinical and radiological success of zinc oxide-ozonated oil, modified 3mix-mp antibiotic paste, and vitapex as treatment options in primary molars requiring pulpectomy: An in vivo study. J Indian Soc Pedod Prev Dent. 2017 Oct-Dec;35(4):346-352. doi: 10.4103/JISPPD.JISPPD_359_16. PMID: 28914248.	1	4
71	Grewal N, Sharma N, Chawla S. Comparison of resorption rate of primary teeth treated with alternative lesion sterilization and tissue repair and conventional endodontic treatment: An in vivo randomized clinical trial. J Indian Soc Pedod Prev Dent. 2018 Jul-Sep;36(3):262-267. doi: 10.4103/JISPPD.JISPPD_140_17. PMID: 30246747.	1	3
72	Jain N, Garg S, Dhindsa A, Joshi S, Khatria H. Impact of 6% citric acid and endoactivator as irrigation adjuncts on obturation quality and pulpectomy outcome in primary teeth. Pediatr Dent J. 2019;29(2):59-65. doi: doi.org/10.1016/j.pdj.2019.05.002	1	2
73	Rawson TH, Rayes S, Strizich G, Salazar CR. Longitudinal Study Comparing Pulpectomy and Pulpotomy Treatments for Primary Molars of Alaska Native Children. Pediatr Dent. 2019 May 15;41(3):214-220. PMID: 31171074.	1	1
74	Okamoto CB, Bussadori SK, Prates RA, da Mota ACC, Tempestini Horliana ACR, Fernandes KPS, Motta LJ. Photodynamic therapy for endodontic treatment of primary teeth: A randomized controlled clinical trial. Photodiagnosis Photodyn Ther. 2020 Jun;30:101732. doi: 10.1016/j.pdpdt.2020.101732. Epub 2020 Apr 7. PMID: 32171875.	1	1
75	Boonchoo K, Leelataweewud P, Yanpiset K, Jirarattanasopha V. Simplify pulpectomy in primary molars with a single-file reciprocating system: a randomized controlled clinical trial. Clin Oral Investig. 2020 Aug;24(8):2683-2689. doi: 10.1007/s00784-019-03130-5. Epub 2019 Nov 22. PMID: 31758268.	1	2

76	Pandranki J, V Vanga NR, Chandrabhatla SK. Zinc oxide eugenol and Endoflas pulpectomy in primary molars: 24-month clinical and radiographic evaluation. J Indian Soc Pedod Prev Dent. 2018 Apr-Jun;36(2):173-180. doi: 10.4103/JISPPD.JISPPD_1179_17. PMID: 29970635.	1	6
77	Stallaert KM, Sigal MJ, Titley KC, Andrews PB. A retrospective study of root canal therapy in non-vital primary molars. Eur J Paediatr Dent. 2016 Dec;17(4):295-300. PMID: 28045317.	0	8
78	Lopes-Fatturi A, Souza JF, Menezes JVNB, Fraiz FC, Assunção LRS. A Survival Analysis of Different Pulp Therapies in Decayed Primary Teeth. Pesq Bras Odontoped Clín Integr. 2020;20:e4822. doi: 10.1590/pboci.2020.038	0	0
79	Aguilar-Ayala FJ, Rejón-Peraza ME, Cauich-Rodríguez JV, Borges-Argáez R, Pinzón-Te AL, González-Alam CJ, Aguilar-Pérez FJ. Biophysicochemical study of propolis and its clinical and radiographic assessment in dental pulpectomy. Drug Invent Today. 2019 Dec 16;12(12):2928.	0	0
80	Menni AC, Ambati NR, Prasad MG. Clinical and radiographic evaluation of Curcumin Gel mixed Endoflas (CGE) powder as obturating material in primary molars. Braz Dent Sci. 2020 Jan/Mar;23(1). doi: 10.14295/bds.2020.v23i1.1733	0	0
81	Goel H, Mathur S, Sachdev V. Clinical and radiographic evaluation of four different zinc-oxide integrated root canal obturating materials used in primary teeth. Pediatr Dent J. 2018;28(2):73-86. doi: 10.1016/j.pdj.2018.06.002	0	1
82	Sahebalam R, Sarraf A, Jafarzadeh H, Jouybari-Moghaddam M, Seyed-Musavi S. Clinical and Radiographic Success of Electrosurgical Pulpectomy in Primary Teeth. Bull Tokyo Dent Coll. 2017;58(2):77-83. doi: 10.2209/tdcpublication.2016-0006. PMID: 28724862.	0	3
83	Krishna DRM, Setty JV, Srinivasan I, Melwani A. Comparison between Rotary (Mtwo) and Manual (H-Files) Techniques for Instrumentation of Primary Teeth Root Canals. Indian J Dent Res. 2019 Nov-Dec;30(6):899-903. doi: 10.4103/ijdr.IJDR_59_18. PMID: 31939368.	0	0
84	Farokh-Gisour E, Parirokh M, Kheirmand Parizi M, Nakhaee N, Aminizadeh M. Comparison of Postoperative Pain Following One-Visit and Two-Visit Vital Pulpectomy in Primary Teeth: A Single-Blind Randomized Clinical Trial. Iran Endod J. 2018 Winter;13(1):13-19. doi: 10.22037/iej.v13i1.18205. PMID: 29692829; PMCID: PMC5800435.	0	1
85	Divya S, Jeevanandan G, Sujatha S, Subramanian EMG, Ravindran V. Comparison of quality of obturation and post-operative pain using manual vs rotary files in primary teeth - A randomised clinical trial. Indian J Dent Res. 2019 Nov-Dec;30(6):904-908. doi: 10.4103/ijdr.IJDR_37_18. PMID: 31939369.	0	0

86	Goel H, Mathur S, Sachdev V. Evaluation of a mixture of zinc oxide-10% sodium fluoride as novel root canal filling material: A pilot study!! J Indian Soc Pedod Prev Dent. 2019 Oct-Dec;37(4):392-398. doi: 10.4103/JISPPD.JISPPD_124_18. PMID: 31710015.	0	0
87	RojaRamya KS, Vinay C, Uloopi KS, Chandrasekhar R. In vivo evaluation of zinc oxide-propolis mixture as root canal filling material in the primary molars: A 24-month follow-up randomized controlled trial. J Indian Soc Pedod Prev Dent. 2020 Apr-Jun;38(2):171-176. doi: 10.4103/JISPPD.JISPPD_127_20. PMID: 32611864.	0	0
88	Barasuol JC, Massignan C, Bortoluzzi EA, Cardoso M, Bolan M. Influence of hand and rotary files for endodontic treatment of primary teeth on immediate outcomes: Secondary analysis of a randomized controlled trial. Int J Paediatr Dent. 2021 Jan;31(1):143-151. doi: 10.1111/ipd.12682. Epub 2020 Jun 28. PMID: 32516507.	0	0
89	de Alencar NA, Oriano MD, Bolan M, Cardoso M. Is there any difference in length measurement methods for pulpectomies in primary teeth?-A double-blind, controlled clinical trial. Int J Paediatr Dent. 2019 Nov;29(6):712-719. doi: 10.1111/ipd.12567. Epub 2019 Aug 24. PMID: 31356705.	0	1
90	Tannure PN, Barcelos R, Gotze GR, Azevedo CP, Gleiser R, Primo LG. Pulpectomias com Remoção de Smear-Layer em Dentes Decíduos Anteriores: Cinco Anos de Acompanhamento. Pesq Bras Odontoped Clín Integr. 2011 Abr-Jun;11(2):251-256. doi: 10.4034/PBOCI.2011.112.16	0	1
91	Massara MLA, Tavares WLF, Noronha JC, Henriques LCF, Ribeiro Sobrinho AP. A Eficácia do Hidróxido de Cálcio no Tratamento Endodôntico de Decíduos: Seis Anos de Avaliação. Pesq Bras Odontoped Clín Integr. 2012 Abr-Jun;12(2):155-59. doi: 10.4034/ PBOCI: 2012.122.01	+	12
92	Tang Y, Xu W. Therapeutic effects of Pulpotomy and Pulpectomy on deciduous molars with deep caries. Pak J Med Sci. 2017 Nov-Dec;33(6):1468-1472. doi: 10.12669/pjms.336.13488. PMID: 29492080; PMCID: PMC5768846.	+	3
93	Govindaraju L, Jeevanandan G, Emg S, Vishawanathaiah S. Assessment of Quality of Obturation, Instrumentation Time and Intensity of Pain with Pediatric Rotary File (Kedo-S) in Primary Anterior Teeth: A Randomized Controlled Clinical Trial. Int J Clin Pediatr Dent. 2018 Nov-Dec;11(6):462-467. doi: 10.5005/jp-journals-10005-1558. PMID: 31303731; PMCID: PMC6611531.	+	2
94	Zacharczuk GA, Toscano MA, López GE, Ortolani AM. Evaluation of 3Mix-MP and pulpectomies in non-vital primary molars. Acta Odontol Latinoam. 2019 Apr 1;32(1):22-28. PMID: 31206571.	+	2

95	Rai R, Shashibhushan KK, Babaji P, Chandrappa PM, Reddy VR, Ambareen Z. Clinical and Radiographic Evaluation of 3Mix and Vitapex as Pulpectomy Medicament in Primary Molars: An In Vivo Study. Int J Clin Pediatr Dent. 2019 Nov-Dec;12(6):532-537. doi: 10.5005/jp-journals-10005-1686. PMID: 32440070; PMCID: PMC7229390.	+	1
96	Silva BS, Nicoloso GF, Ruiz LF, Melo TAF, Casagrande L. Does Endodontic Re-Treatment in Primary Teeth Increase the Functional Tooth Retention? A Clinical, Retrospective, University-Based Study. Pesq Bras Odontoped Clín Integr. 2019;19:e3902. doi: 10.4034/PBOCI.2019.191.10	+	1
97	Winnier J, Suresh R. A Comparative Evaluation of a Labial Approach with a Conventional Palatal Approach for Endodontic Access in Primary Maxillary Incisors: A Pilot Study. Int J Clin Pediatr Dent. 2020 Jan-Feb;13(1):53-56. doi: 10.5005/jp-journals-10005-1704. PMID: 32581480; PMCID: PMC7299880.	+	0
98	El-Hak OSG, Khattab NM. Clinical and Radiographic Evaluation of WaveOne Gold Single-File System in Pulpectomy of Primary Molars: A Randomized Clinical Trial. Indian J Public Health Res Dev. 2020 Feb;11(2):1417-1422. doi: 10.37506/v11/i2/2020/ ijphrd/195023	+	0

Legend:

+ : article not indexed in the database.

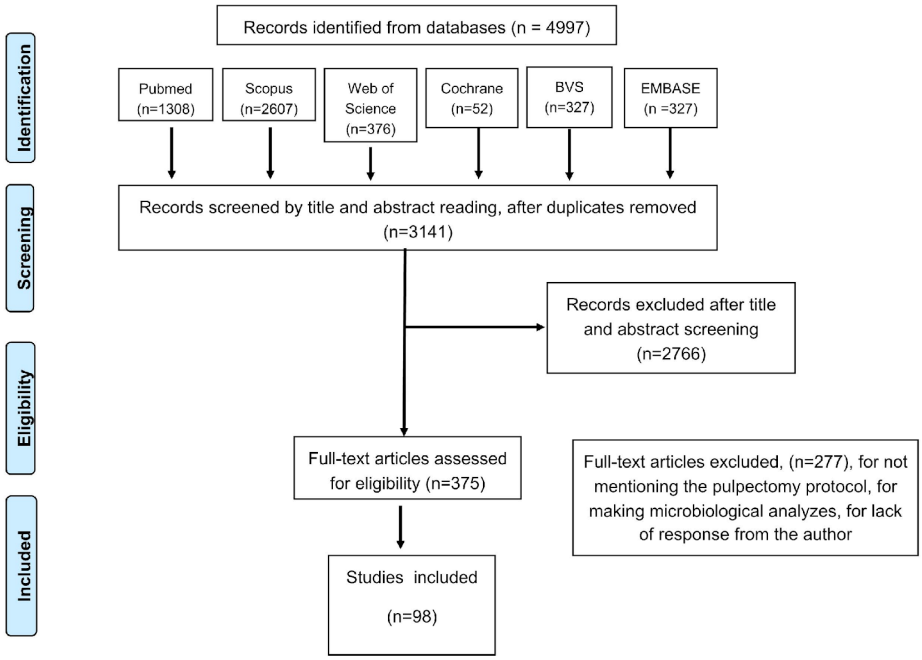

Figure 1 - Flowchart of the search results from databases

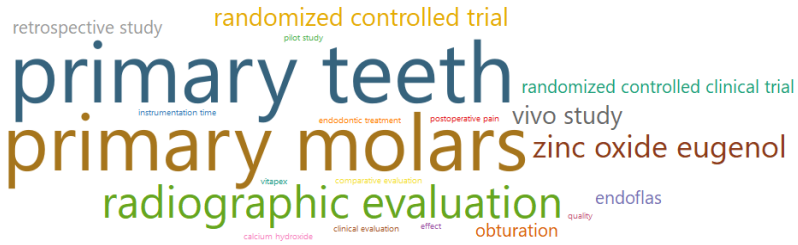

Figure 2 - Word cloud of the 20 most cited words in the title and abstract that were not in the search strategy. The larger the word, the greater the number of citations

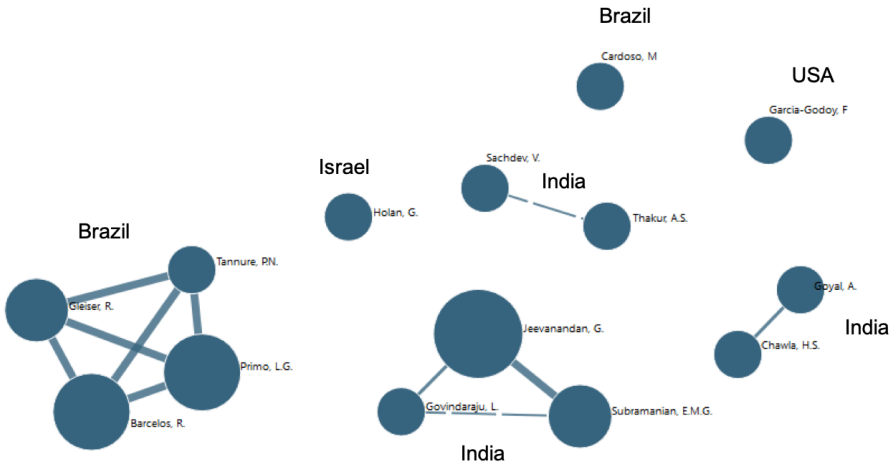

Figure 3 - Top authors networks correlation, considering collaborations in publications. The thicker the line, the greater the collaboration between the authors.

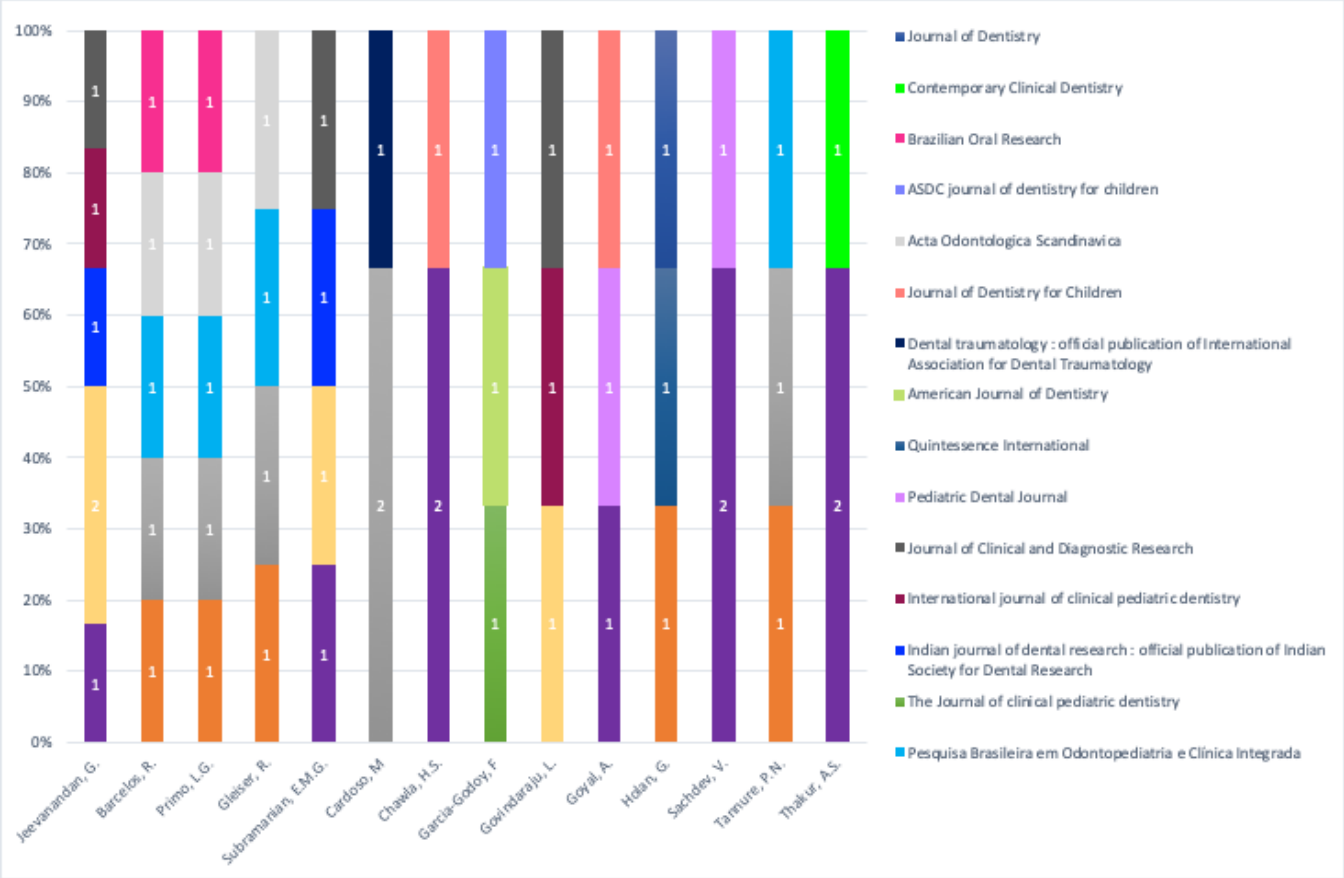

Figure 4 – Authors who published 3 or more articles on “pulpectomy in primary teeth” and journals where their papers were published.

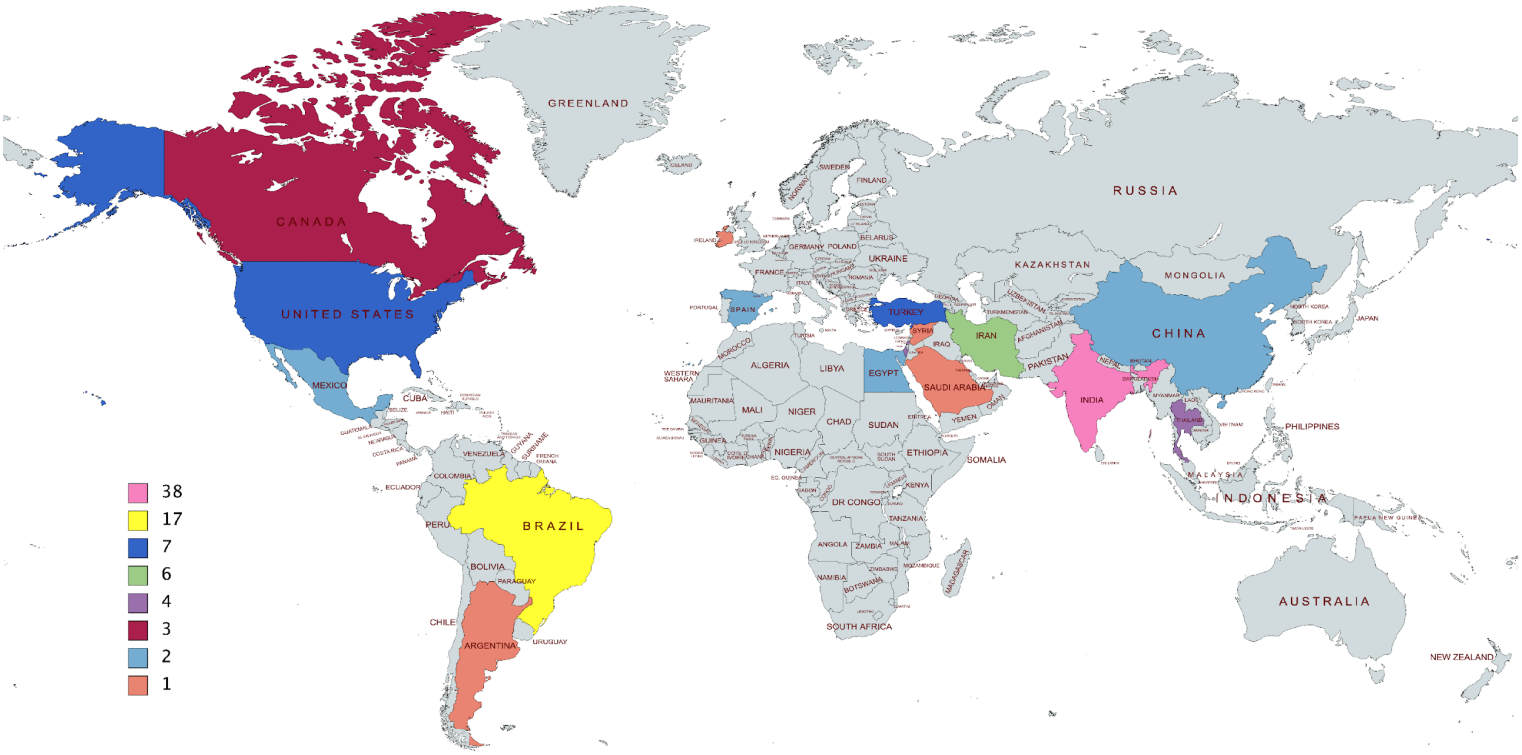

Figure 5 - World map of the publication density per country

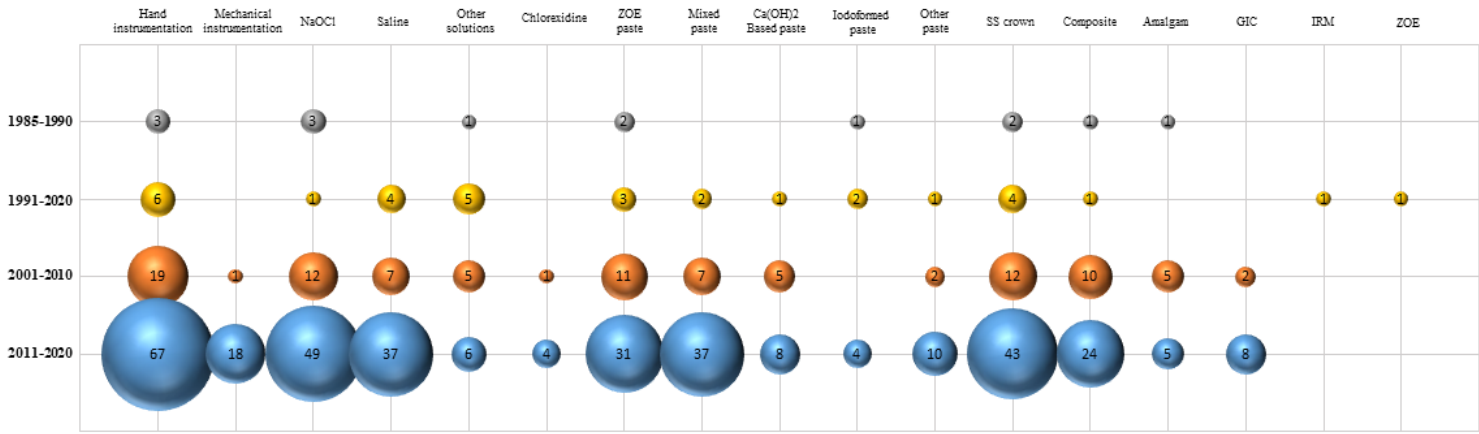

Figure 6 - Type of instrumentation, irrigation solution, filling paste and restorative material per decade

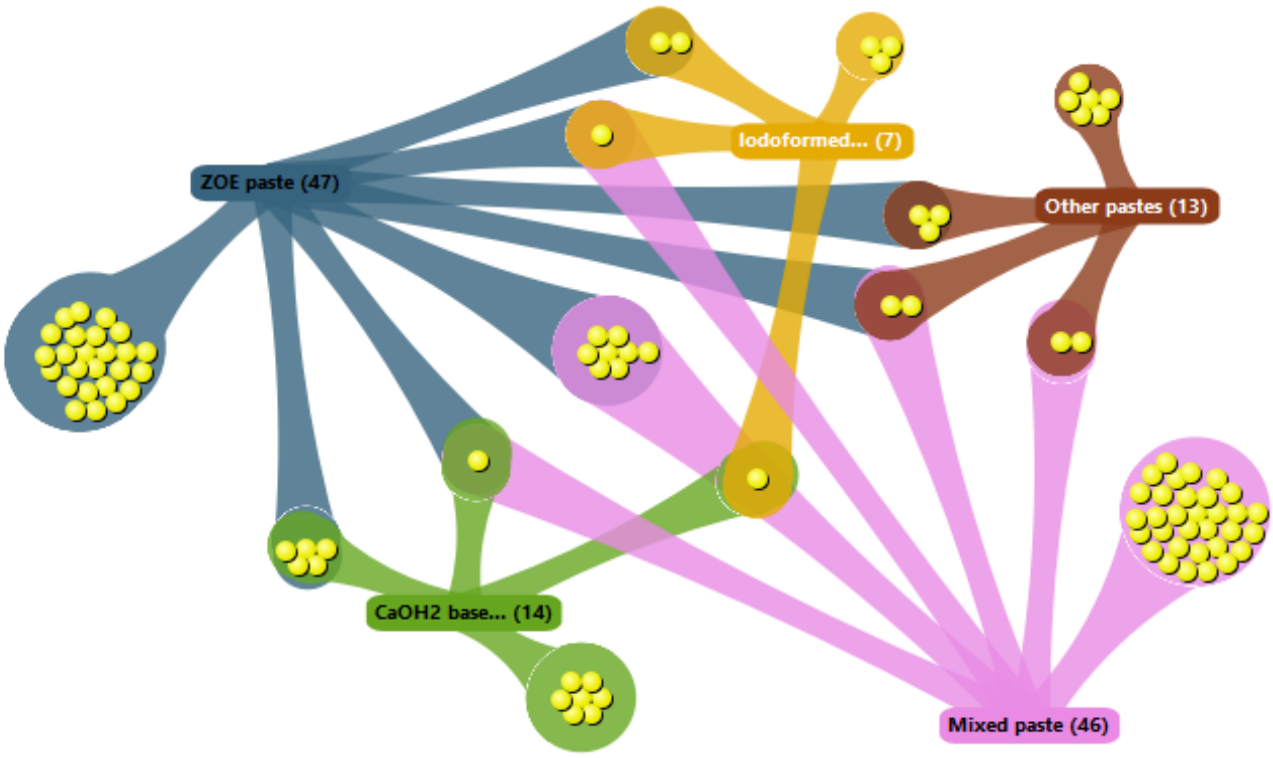

Figure 7 - Cluster map of root filling pastes according to the number of published studies. The number of studies is represented by yellow circles

4.2 Artigo 2: Does calcium hydroxide reduce endotoxins in infected root canals? Systematic review and meta-analysis.

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REVIEW ARTICLE

Does Calcium Hydroxide Reduce Endotoxins in Infected Root Canals? Systematic Review and Meta-analysis

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ABSTRACT

Introduction: The purpose of this study was to evaluate the potential of endotoxin reduction by comparing the number of lipopolysaccharides (LPSs) before and after the use of calcium hydroxide ($Ca[OH]_2$) as intracanal medication (ICM). **Methods:** Searches were performed up to June 2020. Clinical and experimental studies comparing the amount of LPSs before and after the use of $Ca(OH)_2$ as ICM in infected root canals were included. Risks of bias assessment and data extraction were performed. Meta-analysis was conducted by sub-grouping according to $Ca(OH)_2$, the presence of an antimicrobial substance (AS), irrigant solution during chemomechanical preparation (CMP), and the incidence of LPS reduction. The certainty of evidence was determined by the Grading of Recommendations Assessment, Development and Evaluation approach. **Results:** Nine studies were included in the qualitative synthesis and 7 in the meta-analysis. Three articles had low risk of bias (RB), 1 had moderate RB, 2 had high RB, and 3 "some concerns." Overall, $Ca(OH)_2$, with or without AS, reduced mean LPSs before CMP (standardized mean difference [SMD] = −1.087 [confidence interval {CI}, −1.453 to −0.721], $P < .001$, $I^2 = 58.7\%$) and after CMP (SMD = −0.919 [CI, −1.156 to −0.682], $P < .001$, $I^2 = 24.7\%$). Considering the irrigant solutions, the overall results showed a reduction before (SMD = −1.053 [CI, −1.311 to −0.795], $P < .001$, $I^2 = 58.7\%$) and after CMP (SMD = −0.938 [CI, −1.147 to −0.729], $P < .001$, $I^2 = 24,6\%$). Analyses presented very low certainty of evidence. The incidence of LPS reduction was 98.9% and 61.7% for $Ca(OH)_2$ with and without AS, respectively. **Conclusions:** $Ca(OH)_2$ reduces endotoxin levels when used as ICM but is unable to eliminate LPSs completely independent of the irrigating solution used with very low certainty of evidence. *(J Endod 2020;46:1545–1558.)*

SIGNIFICANCE

Calcium hydroxide is the material most widely used as endodontic intracanal medication because of its bactericidal effect. Although it reduces endotoxin levels when used as intracanal medication, it is unable to eliminate LPS completely independent of the irrigating solution used.

KEY WORDS

Calcium hydroxide; endotoxins; lipopolysaccharides

Microorganisms and their products play the main etiologic role in the pathology of necrotic pulps and periapical lesions[1,2]. Endotoxins, present in all gram-negative bacteria, are composed of polysaccharides, lipids, and proteins, constituting a special type of endotoxin called lipopolysaccharide (LPS)[3,4]. LPS is anchored in the outer cell membrane[3,4] and is released during multiplication or when bacterial death occurs, causing biological effects that lead to an inflammatory reaction and periapical bone resorption[4].

Among LPS mechanisms of action, 1 of the most important is its action on macrophages because it triggers the release of a number of chemical mediators of inflammation and cytokines such as tumor necrosis factor (TNF), interleukin 1, and interleukin 8[4–9]. Endotoxins also induce fever, activate the complement system, induce the metabolism of arachidonic acid, and adhere irreversibly to mineralized tissues[6]. These events emphasize the important role of LPS in the pathogenesis of periapical lesions[4,5,7].

LPS presents very toxic activity on the periapical tissues, and, even in minimal concentrations, it can exert a significant effect on host tissues[10]. Therefore, the endodontic treatment of teeth with pulp necrosis and periapical lesions should not be restricted to eliminating bacteria[11] but should also remove dead cells and/or promote the inactivation of lipid A, the toxic portion of the endotoxin.

Calcium hydroxide ($Ca[OH]_2$) has been the material most widely used as endodontic intracanal medication (ICM) because of its bactericidal effect[12,13]. Because of its poor solubility, $Ca(OH)_2$ releases

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calcium and hydroxyl ions slowly, providing an alkaline environment in the periapical region[13–15]. Although many studies have addressed $Ca(OH)_2$ as the best ICM[16–18], there are questions concerning its effectiveness to completely eliminate LPS and the benefit of intracanal dressing in the overall success of endodontic treatment, at least in cases in which signs and symptoms of endodontic origin are absent[19]. Thus, the objective of this systematic review was to evaluate endotoxin reduction by comparing the amount of LPS before and after the use of $Ca(OH)_2$ as ICM.

MATERIALS AND METHODS

Study Design

This systematic review is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement[20,21] and registered on the PROSPERO database (CRD42019124394). The research question was the following: Is calcium hydroxide effective against endotoxins in the infected canals of deciduous and permanent teeth?

Search Strategy and Eligibility Criteria

Controlled vocabulary (MeSH terms) and free key words were used in the search strategies, which were defined based on the Population, Intervention, Comparisons, and Outcome criteria[22]. A systematic literature search was conducted on the following electronic databases up to June 2020: PubMed, Cochrane Library, LILACS/Biblioteca Brasileira de Odontologia via Virtual Health Library, Web of Science, Embase, and Scopus. The gray literature was also searched through Google Scholar, the Turning Research Into Practice database, the International Association for Dental Research, and OpenGrey. A manual search was performed in order to avoid missing relevant publications. Experts in the field were also contacted to help with the systematic search. The search strategy was performed independently by 2 reviewers (N.R.B. and P.N.) using the terms "endotoxin," "lipopolysaccharide," "LPS," and "calcium hydroxide" combined by the Boolean operators AND/OR. An expert librarian (D.M.F.) guided the search strategy and adapted it for each database, with no language or date restrictions (Table 1). A weekly search alert was created to notify new studies according to the outlined search strategy.

The eligibility criteria were based on the Population, Intervention, Comparisons, and Outcome criteria strategy[22], which included human subjects with permanent dentition (Population) in which the amount of LPS was evaluated after the use of $Ca(OH)_2$ as intracanal medication (Intervention) compared with the amount of LPS before the use of $Ca(OH)_2$ (Comparisons) to identify the antimicrobial efficacy against LPS (Outcome). In this sense, experimental studies and randomized and nonrandomized clinical studies that compared the amount of LPS in infected root canals before and after the use of $Ca(OH)_2$ were included. Case reports, case series, literature reviews, editorials, opinions, technical articles, surveys, guidelines, conferences, comments, and animal studies were excluded.

Study Selection

Two review authors (N.R.B. and P.N.) performed the study selection independently through evaluation of the titles and abstracts of

TABLE 1 - Search Strategies

Database	Search strategies
PubMed	((((Lipopolysaccharides[MeSH Terms] OR Lipopolysaccharide*[Title/Abstract] OR lps[Title/Abstract] OR endotoxins[MeSH Terms] OR endotoxin*[Title/Abstract] OR Lipoglycan*[Title/Abstract] OR lipoglycans[MeSH Terms] OR Lipoteichoic Acid [MeSH Terms] OR Lipoteichoic Acid*[Title/Abstract] OR LTA[Title/Abstract])))) AND (Calcium Hydroxide[MeSH Terms] OR Calcium Hydroxide[Title/Abstract] OR Hydroxide Calcium[Title/Abstract] OR CaOH2[Title/Abstract])
Scopus	(Lipopolysaccharide* OR lps OR endotoxin* OR Lipoglycan* OR "Lipoteichoic Acid" OR LTA) AND ("Calcium Hydroxide" OR "Hydroxide Calcium" OR CaOH2)
Embase	'lipopolysaccharides'/exp OR lipopolysaccharide*:ab,ti OR lps:ab,ti OR endotoxin*:ab,ti OR 'endotoxins'/exp OR lipoglycan*:ab,ti OR lipoglycans:ab,ti OR 'lipoteichoic acid'/exp OR 'lipoteichoic acid*':ab,ti OR lta:ab,ti AND 'calcium hydroxide'/exp OR 'calcium hydroxide':ab,ti OR 'hydroxide calcium':ab,ti OR caoh2:ab,ti
Web of Science	Lipopolysaccharide* OR lps OR endotoxin* OR Lipoglycan* OR "Lipoteichoic Acid" OR LTA AND "Calcium Hydroxide" OR "Hydroxide Calcium" OR "CaOH2"
Cochrane Library	#1 MeSH descriptor: [Lipopolysaccharides] explode all trees #2 (Lipopolysaccharide*):ti,ab,kw #3 (LPS):ti,ab,kw #4 (LTA):ti,ab,kw #5 (Lipoglycan*):ti,ab,kw #6 (Lipoteichoic Acid):ti,ab,kw #7 (endotoxin*):ti,ab,kw #8 MeSH descriptor: [Endotoxins] explode all trees #9 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 #10 MeSH descriptor: [Calcium Hydroxide] explode all trees #11 (Calcium Hydroxide):ti,ab,kw #12 (Hydroxide Calcium):ti,ab,kw #13 (CaOH2):ti,ab,kw #14 #10 OR #11 OR #12 OR #13 #15 #9 AND #14
BVS	(tw:((mh: "lipopolysaccharides" OR "lipopolissacarideos" OR lipopolysaccharide* OR mh: "endotoxins" OR "endotoxinas" OR endotoxin*))) AND (tw:(tw:(lipopolysaccharides" OR "lipopolissacarideos" OR lipopolysaccharide* OR mh: "endotoxins" OR "endotoxinas" OR endotoxin*))) AND (tw:((mh: "Calcium Hydroxide" OR "Hidroxido de Calcio" OR "Hydroxide Calcium" OR caoh2))) AND (instance:"regional") AND (db:("BBO" OR "LILACS") AND type:("article"))
Gray Literature	lipopolysaccharide OR endotoxin OR lps AND calcium hydroxide OR hydroxide calcium

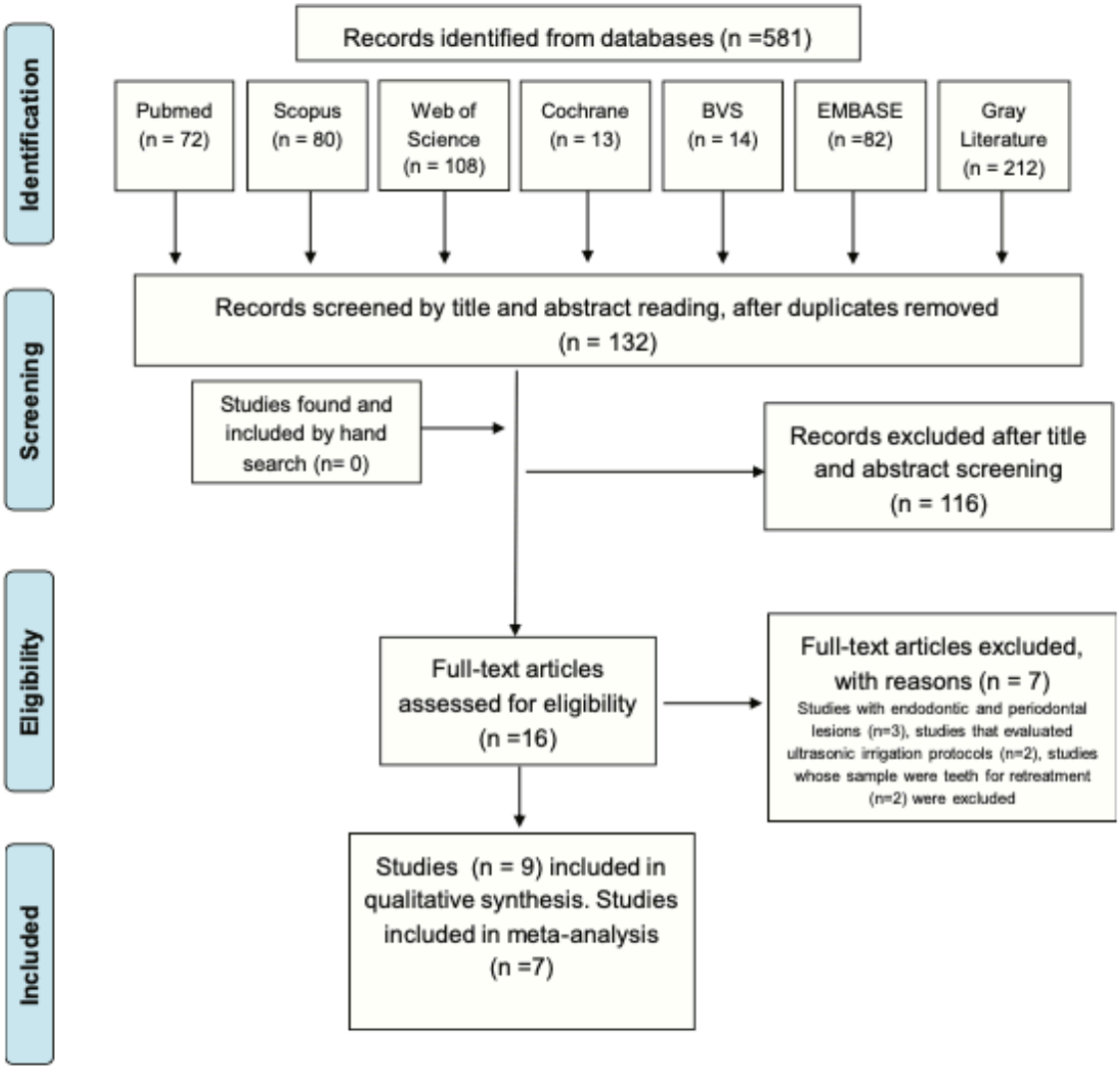

FIGURE 1 – The Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram of the search results from the databases.

all studies identified in the electronic databases according to the eligibility criteria. Full articles were retrieved and examined when their title and abstract did not provide enough information for a definite decision. Any disagreements regarding the eligibility of studies for inclusion were resolved through consensus or with the help of a third author (L.G.P.).

Articles identified in databases and by manual search were compiled into a bibliographic reference manager (Online version of EndNote, Version X7; Thomson Reuters, Philadelphia, PA), and duplicate references were removed. Articles that met the eligibility criteria were included in this review.

Data Extraction

The main characteristics of the selected studies were tabulated and evaluated according to a descriptive analysis. Two reviewers (N.R.B. and P.N.) extracted and tabulated the following data: references (title, authors, year of publication, and geographic location), study design, sample size, age group, symptoms, type of intracanal medication and irrigation solution used, and time of intracanal medication. If there was any information missing, the authors were contacted weekly via e-mail to obtain the data for up to 5 weeks. If there was no response, the study was not included in the meta-analysis.

Quality Assessment

Two independent reviewers (N.R.B. and P.N.) assessed the quality of the included studies. The RoB 2 tool was used to analyze the risk of

TABLE 2 - The Characteristics of the Included Studies

			Population			Intervention		Evaluation	
Author, year	**Country**	**Type of study**	**Sample (*n*)**	**Age range (mean)**	**Symptoms**	**ICM**	**Irrigation solution**	**Time of intracanal medication**	**LAL quantification**
Adl et al, 2013[31]	Iran	Intervention before and after	24 single-rooted teeth (n = 24)	26–61 years	Necrotic pulps and apical periodontitis	$CaOH_2$	Sterile/pyrogen-free saline	7 days	QCL
Alarbeed et al, 2019[32]	Egypt	RCT	43 single-rooted teeth (n = 15)	18–51 years	Necrotic pulps and apical periodontitis	2% CHX group: $Ca(OH)_2$ + 2% CHX gel, $Ca(OH)_2$ group, and control group: no ICM	2.5% NaOCl	14 days	Sandwich ELISA assay
Carvalho et al, 2016[33]	Brazil	Nonrandomized	33 teeth (n = 11)	—	Necrotic pulps and apical periodontitis	$Ca(OH)_2$ + 2% CHX gel	2.5% NaOCl + $Ca(OH)_2$ solution (0.14%, limewater) group, 2.5% NaOCl + 10,000 UI/mL polymyxin B group, and control group: 2.5% NaOCl	14 days	KQCL
De Oliveira et al, 2012[16]	Brazil	Nonrandomized	36 teeth (n = 12)	19–55 years	Necrotic pulps and apical periodontitis	$Ca(OH)_2$ pro-analysis + 2% CHX gel	2% chlorhexidine gel + limewater 0.14% $Ca(OH)_2$ group, 2% CHX gel + polymyxin B group, and 2% CHX gel group	14 days	KQCL
Marinho et al, 2014[35]	Brazil	RCT	30 teeth (n = 10)	—	Necrotic pulps and apical periodontitis	$Ca(OH)_2$ + saline solution	2.5% NaOCl group, 2% CHX gel group, and saline solution group	30 days	TKA
Martinho et al, 2017[34]	Brazil	RCT	72 single-rooted teeth (n = 12 per group)	—	Pulp necrosis and apical periodontitis	7-day groups = control group: $Ca(OH)_2$ + saline solution, 2% CHX group: $Ca(OH)_2$ + 2% CHX gel, 2% CHX gel group, 14-day groups = control group: $Ca(OH)_2$ + saline solution, 2% CHX group: $Ca(OH)_2$ + 2%	2.5% NaOCl group and 17% EDTA group	7 and 14 days	KQCL

(*continued on next page*)

TABLE 2 - Continued

Author, year	Country	Type of study	Population			Intervention		Evaluation	
			Sample (*n*)	Age range (mean)	Symptoms	ICM	Irrigation solution	Time of intracanal medication	LAL quantification
						CHX gel, and 2% CHX gel group			
Sousa et al, 2014[17]	Brazil	Intervention – before and after	10 patients	—	Pulp necrosis and acute apical abscesses	$Ca(OH)_2$ + 2% CHX gel paste	2% CHX	30 days	TKA
Vianna et al, 2007[19]	Brazil	RCT	24 single-rooted teeth (*n* = 8)	18–65 years	Necrotic pulp tissues apical periodontitis	Control group: $Ca(OH)_2$ paste, 2% CHX gel group, and 2% CHX group: $Ca(OH)_2$ + 2% CHX gel	2% CHX	7 days	QCL
Xavier et al, 2013[18]	Brazil	RCT	48 single-rooted teeth (*n* = 12 per group)	—	Necrotic pulp	Ca(OH)2 paste EDTA 17%	1-visit treatment: 1% NaOCl group and 2% CHX gel group 2-visit treatment: 1% NaOCl + $Ca(OH)_2$ group and 2% CHX gel + $Ca(OH)_2$ group	14 days	KQCL

Ca(OH)2, calcium hydroxide; CHX, chlorhexidine; ELISA, enzyme-linked immunosorbent assay; ICM, intracanal medication; KQCL, chromogenic kinetic assay; NaOCl, sodium hypochlorite; QCL, quantitative chromogenic assay; RCT, randomized controlled trial; TKA, turbidimetric kinetic assay.

bias of randomized studies[23], the ROBINS-I tool was used to evaluate the risk of bias of nonrandomized studies[24], and the Before-and-After tool was applied to analyze the experimental studies[25].

Meta-analysis

Meta-analyses were performed using Comprehensive Meta-Analysis software v3 (Biostat, Inc, Englewood, NJ) to evaluate the mean LPS reduction after the use of $Ca(OH)_2$ as ICM, and MedCalc software 18.2.1 (MedCalc Software BVBA, Ostend, Belgium) was used to calculate the incidence of LPS reduction after the use of $Ca(OH)_2$ as ICM.

First, the mean or mean difference of intracanal LPS before and after the use of $Ca(OH)_2$ as ICM was considered, and an interpatient correlation coefficient of 0.5 was assumed because the patient was his or her own control[23]. Two moments of "before ICM use" were considered, after endodontic access (before chemomechanical preparation [CMP]) and after CMP (immediately before ICM), in an attempt to isolate the influence of ICM on LPS levels. Because the 2 moments showed a different numerical mean LPS, different meta-analyses were performed. The meta-analyses were subgrouped according to $Ca(OH)_2$ use with or without an antimicrobial substance and irrigant solution during CMP. Additionally, a subgroup analysis was performed to evaluate the LPS levels in different time points. The pooled effect size was calculated by the standardized mean difference (SMD) because the outcome presented methodological variations between studies.

In a second analysis, the number of teeth with LPS reduction (incidence of reduction) and the total number of teeth evaluated in each study for each type of $Ca(OH)_2$ were included to calculate the pooled prevalence with the 95% confidence interval (CI). The association of the use of $Ca(OH)_2$ with and without an antimicrobial substance was considered for a different outcome, so a specific meta-analysis was performed for each outcome.

In all analyses, heterogeneity was assessed through the I^2 test, and the random effect model was applied. Sensitivity analyses were performed to evaluate the influence of studies with some risk of bias in effect significance.

Certainty of Evidence Assessment

The quality of the evidence (certainty in the estimates of effect) was determined for the outcome using the Grading of Recommendations Assessment, Development

TABLE 3 - Quality Assessment of Randomized Studies according to the Cochrane Collaboration's Tool for Randomized Controlled Studies, Nonrandomized Clinical Trials according to the ROBINS-I Tool, and Experimental Studies according to the Before-and-After Tool

Randomized studies

Author, year	Bias arising from the randomization process	Bias due to deviations from intended interventions	Bias due to missing outcome data	Bias in measurement of the outcome	Bias in selection of the reported result	Overall bias
Alarbeed et al, 2019[32]	+	+	+	+	+	+
Marinho et al, 2014[35]	+	#	X	+	+	#
Martinho et al, 2017[34]	+	#	+	+	+	+
Vianna et al, 2007[19]	#	#	+	+	+	#
Xavier et al, 2013[18]	+	#	X	+	+	#

Nonrandomized studies

Author, year	Confounding	Selection of participants into the study	Classification of interventions	Deviations from intended intervention	Missing data	Measurement of outcomes	Selection of the reported result	Overall rating of bias
Carvalho et al, 2016[33]	*	+	+	?	+	+	+	X
De Oliveira et al, 2012[16]	*	!	+	?	+	+	+	X

Experimental studies

Author, year	Was the study question or objective clearly stated?	Were eligibility/ selection criteria for the study population prespecified and clearly described?	Were the participants in the study representative of those who would be eligible for the test/service/ intervention in the general or clinical population of interest?	Were all eligible participants who met the prespecified entry criteria enrolled?	Was the sample size sufficiently large to provide confidence in the findings?	Was the test/ service/ intervention clearly described and delivered consistently across the study population?	Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed consistently across all study participants?	Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests done that provided *P* values for the pre- to postchanges?	Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention?	Overall rating of bias
Adl et al, 2013[21]	✓	✓	✓	-	?	✓	✓	✓	✓	✓	+
Sousa et al, 2014[17]	✓	✓	✓	?	?	✓	✓	?	✓	✓	!

+, low risk; X, high risk; !, moderate risk; ?, Unclear; *, serious risk; ✓, yes; -, no; #, some concerns.

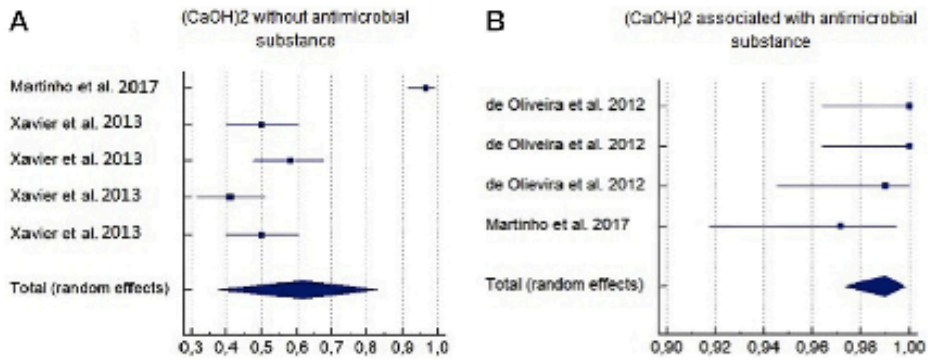

FIGURE 2 – The incidence of LPS reduction in teeth treated with $Ca(OH)_2$ (*A*) without an antimicrobial substance and (*B*) with an antimicrobial substance. (*A*) The first study reported was Martinho et al[34]followed by Xavier et al[18] subgroups that were reported sequentially as follows: 1% NaOCl group 1 visit, 1% NaOCl + $Ca(OH)_2$ group 2 visit, 2% CHX gel group 1 visit, and 2% CHX gel + Ca(OH)2 group 2 visit. (*B*) De Oliveira et al[16] subgroups were sequentially reported as follows: 2% CHX gel + limewater 0.14% $Ca(OH)_2$ group, 2% CHX gel + polymyxin B group, and 2% CHX gel group. LPS assessment methods: chromogenic kinetic assay (De Oliveira et al, Xavier et al, and Martinho et al).

and Evaluation approach[26]. The quality of the evidence can vary from very low to high[27–30].

RESULTS

Study Selection

Initially, 581 potentially relevant studies were identified from all searched databases; 449 duplicates were excluded. After title, abstract, and full-text evaluation, 9 studies were included in the qualitative synthesis[16–19,31–35] and 7 in the meta-analysis[16–18,31–34]. After a manual search in the reference lists of the included studies, no new references were added. The flow diagram is presented in Figure 1.

Characteristics of Included Articles

In the included studies, the limulus amoebocyte lysate (LAL) assays used are generally categorized into 3 types, all of which are accepted in the determination of endotoxin products according to the United States Pharmacopeia[36]: gel clot, turbidimetric, and chromogenic. Four common methods were used for quantifying the LPS in the studies in this review: the turbidimetric kinetic assay[17,35], the sandwich enzyme-linked immunosorbent assay (ELISA)[32], the quantitative chromogenic assay (QCL)[19,31], and the chromogenic kinetic assay (KQCL)[16,18,33,34].

The characteristics of the studies concerning sample, age range, symptoms, type of ICM and irrigation solution used, time of ICM, and results are presented in Table 2. Some studies[16–18,31–35] showed that the use of $Ca(OH)_2$ significantly reduced the amount of endotoxins and that the longer the ICM time, the greater the reduction. Only 1 concluded that a further significant reduction was not achieved by the inclusion of ICM in the root canal for 7 days[19].

Risk of Bias

Assessment of the risk of bias of the selected studies is presented in Table 3. With regard to the studies' overall risk of bias, 3 articles presented a low risk of bias[31,32,34], 1 was considered to have a moderate risk of bias[17], 2 showed a high risk of bias[16,33], and 3 presented "some concerns"[18,19,35].

Risk of Bias of Randomized Clinical Trials

Only 2 of the selected full-text studies reported the method of randomization[32,34]. Because this item was a key domain in the current systematic review, the other authors were contacted to obtain additional information, but neither of them responded. Based on the information about randomization, 3 studies were considered to be at low risk of bias[18,32,34], and 2 presented "some concerns"[19,35]. In all of the studies, the data were read by software that automatically calculated the log/log linear correlation between the reaction time of each standard solution and the corresponding endotoxin concentration; for this reason, they were considered to be at low risk of bias for the "bias in measurement of the outcome" domain.

Four studies[18,19,34,35] did not provide information about if participants and people delivering the interventions were aware or unaware of intervention groups during the trial; therefore, they were graded as having some concerns in "bias due to deviations from intended interventions" domain.

Vianna et al[19], Xavier et al[18], Marinho et al[35], Martinho et al[34], and Alarbeed et al[32] evaluated the presence or absence of pain after treatment and compared the initial and final amount of endotoxins, which were well discriminated in the methodology; thus, these studies were classified as low risk in the "selection of reported result" domain.

Risk of Bias of Nonrandomized Clinical Trials

Concerning the "blinding of participants and professionals" domain, all studies were classified as having low risk of bias because we considered that professional blinding would be difficult to perform because of the peculiarities of the ICM such as color and smell.

Neither of the studies[16,33] presented any information about "deviations from intended observation." They were considered to have low risk of bias in "selection of the reported result" because there was clear evidence that all reported results corresponded to all intended outcomes and analyses. Regarding "selection of participants into the study," the 2 studies were considered as having moderate risk because the start of follow-up and the start of intervention did not coincide for all participants. For the confounding domain, both were classified as having serious risk of bias because they evaluated different irrigants during treatment. Thus, in the overall bias classification, both were considered at high risk of bias.

Risk of Bias of Experimental Studies

Concerning "missing data," only 1 study was considered to have a moderate risk of bias in this domain because it provided incomplete information about outcome data or loss of follow-up. Also, it did not mention if the loss of follow-up was higher than 20% and if this loss was taken into consideration in the analysis[17].

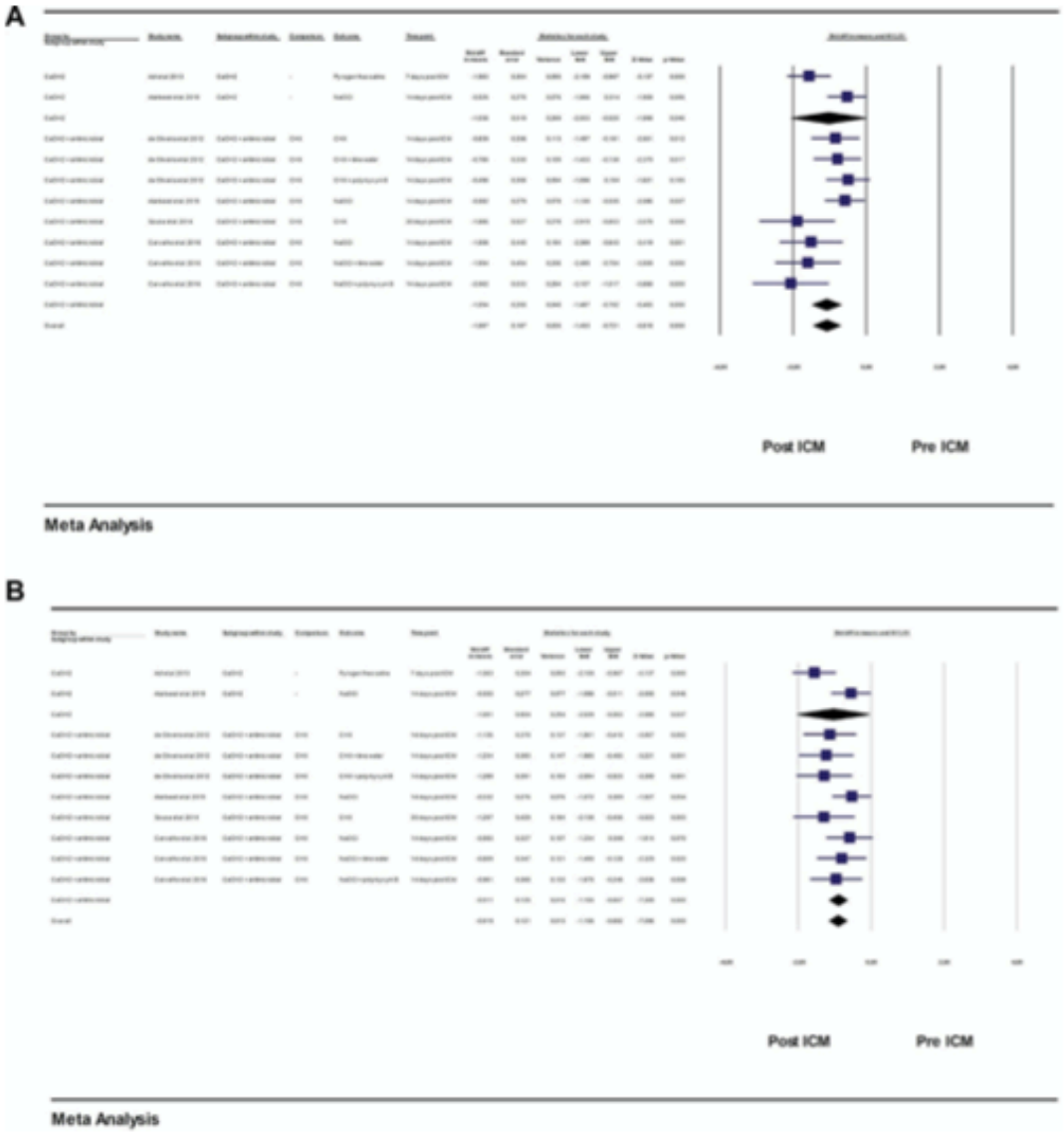

FIGURE 3 – The mean LPS reduction (*A*) before and (*B*) after CMP in teeth treated with and without $Ca(OH)_2$ grouped according to the presence or not of an antimicrobial substance. LPS assessment methods: QCL (Adl et al[31]), sandwich ELISA assay (Alarbeed et al[32], TKA (Sousa et al[17], and KQCL (De Oliveira et al[16] and Carvalho et al[33]).

Meta-analyses and Certainty of Evidence

Seven studies were included considering all meta-analyses. One[19] was excluded because there was no correspondence between the sample size before and after CMP. In addition, another[18] was excluded because the authors gave the reduction values as median and range, and even after some attempts to contact them, no additional information was obtained.

Incidence of LPS Reduction

Three studies were included in the meta-analysis considering $Ca(OH)_2$ with[16,34] and without[18,34] an antimicrobial substance, presenting considerable (I^2 = 96.7%) and moderate (I^2 = 38.6%) heterogeneity, respectively. Of the total teeth treated with $Ca(OH)_2$ without an antimicrobial substance, 61.7% presented a reduction in LPS levels with a confidence interval (CI) range from 37.7%–82.9% (Fig. 2*A*), whereas of the total teeth treated with $Ca(OH)_2$ with an antimicrobial substance, 98.9% had a reduction of LPS levels with a CI range from 97.4%–99.8% (Fig. 2*B*).

Mean LPS Reduction according to $Ca(OH)_2$ Use with or without Antimicrobial Substances

Five studies were included in this meta-analysis[16,17,31–33]. Subgrouped and pooled analyses showed the same results; teeth treated with $Ca(OH)_2$, associated or not with

TABLE 4 - The Grading of Recommendations Assessment, Development and Evaluation Approach

Certainty assessment							No. of patients		Effect	Certainty
No of studies Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Post-ICM	Pre-ICM		
The mean LPS reduction before CMP in teeth treated with and without $Ca(OH)_2$ grouped according to the presence or not of an antimicrobial substance										
5 before-after studies	Not serious	Serious*	Serious†	Serious‡	None		133	133	SMD = −1.087 (−1.453 to −0.721)	⊕◯◯◯ Very low
The mean LPS reduction after CMP in teeth treated with and without $Ca(OH)_2$ grouped according to the presence or not of an antimicrobial substance										
5 before-after studies	Not serious	Not serious	Serious†	Serious‡	None		133	133	SMD = −0.919 (−1.156 to −0.682)	⊕◯◯◯ Very low
The mean LPS reduction before CMP in teeth treated with and without $Ca(OH)_2$ grouped according to the irrigant substance used during CMP										
5 before-after studies	Not serious	Serious*	Serious†	Serious‡	none		133	133	SMD = −1.053 (−1.311 to −0.795)	⊕◯◯◯ Very low
The mean LPS reduction after CMP in teeth treated with and without $Ca(OH)_2$ grouped according to the irrigant substance used during CMP										
5 before-after studies	Not serious	Not serious	Serious†	Serious‡	None		133	133	SMD = −0.938 (−1.147 to −0.729)	⊕◯◯◯ Very low

$Ca(OH)_2$, calcium hydroxide; CI, confidence interval; CMP, chemomechanical preparation; ICM, intracanal medication; LPS, lipopolysaccharide; SMD, standardized mean difference.
*Substantial and significant heterogeneity.
†Most of the studies included only anterior teeth, and no study evaluated primary teeth.
‡The total number of patients is lower than 400.

an antimicrobial substance, had a significantly greater reduction of mean LPS after ICM (SMD = −1.036 [CI, −2.053 to −0.020], $P < .05$, I^2 = 84.3% for $Ca(OH)_2$), without an antimicrobial substance (SMD = −1.094 [CI, −1.487 to −0.702], $P < .001$, I^2 = 54.5%), and for $Ca(OH)_2$ with an antimicrobial substance (SMD = −1.087 [CI, −1.453 to −0.721], $P < .001$, I^2 = 58.7%) with a very low certainty of evidence for pooled results (Fig. 3*A* and Table 4).

Five studies[16,17,31–33] were included in the meta-analysis that evaluated LPS after CMP, and similar results were observed; subgrouped and pooled analyses showed that teeth treated with $Ca(OH)_2$, associated or not with an antimicrobial substance, after CMP had a significantly greater reduction of mean LPS after ICM (SMD = −1.051 [CI, −2.039 to −0.063], $P = .037$, I^2 = 83.3%), for $Ca(OH)_2$ without an antimicrobial substance (SMD = −0.911 [CI, −1.155 to −0.667], $P < .001$, I^2 = 0%), and for $Ca(OH)_2$ with an antimicrobial substance (SMD = −0.919 [CI, −1.156 to −0.682], $P < .001$, I^2 = 24.7%) with a very low certainty of evidence for pooled results (Fig. 3*B* and Table 4).

Mean LPS Reduction according to Irrigant Solution Used during CMP

Five studies were included in this analysis, and 7 different combinations of irrigant solutions were used[16,17,31–33]. Most subgroups showed that teeth treated with $Ca(OH)_2$ had a significantly greater reduction of mean LPS after ICM independent of irrigant solution ($P < .05$), except for CHX + polymyxin B. Teeth treated with chlorhexidine (CHX) + polymyxin B showed similar levels of LPS after ICM (SMD = −0.496 [CI, −1.096 to 0.104], $P > .05$, I^2 = 0%). Overall, the results showed that teeth treated with $Ca(OH)_2$ had a significantly greater reduction of mean LPS after ICM (SMD = −1.053 [CI, −1.311 to −0.795], $P < .001$, I^2 = 58.7%) with a very low certainty of evidence (Fig. 4*A* and Table 4).

The same 5 studies[16,17,31–33] were included in the meta-analysis that evaluated LPS after CMP; in this analysis, it could be observed that all subgroups showed that teeth treated with $Ca(OH)_2$ after CMP had a significantly greater reduction of mean LPS after ICM ($P < .05$) as did pooled results (SMD = −0.938 [CI, −1.147 to −0.729], $P < .001$, I^2 = 24.6%) with a very low certainty of evidence (Fig. 4*B* and Table 4).

Mean LPS Reduction according to Different Time Points Evaluated

Five studies were included in this analysis, and 3 different time points were evaluated[16,17,31–33]. All time points (subgroups) showed that teeth

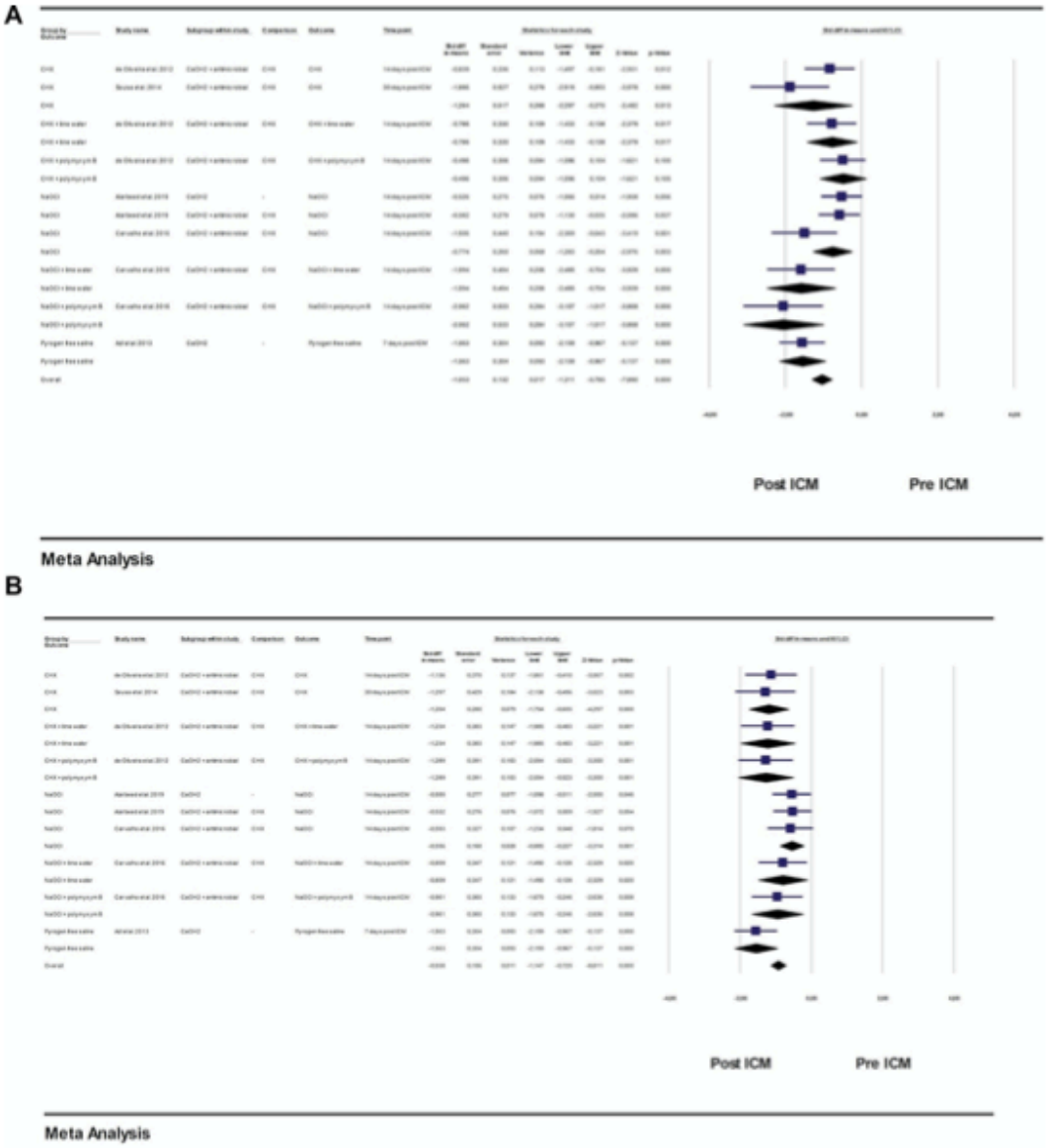

FIGURE 4 – The mean LPS reduction (*A*) before and (*B*) after CMP in teeth treated with and without $Ca(OH)_2$ grouped according to the substance used during CMP. LPS assessment methods: QCL (Adl et al[31]), sandwich ELISA assay (Alarbeed et al[32]), TKA (Sousa et al[17]), and KQCL (De Oliveira et al[16] and Carvalho et al[33]).

treated with $Ca(OH)_2$ had a significantly greater reduction of mean LPS after intracanal medication (7 days: SMD = −1.142 [CI, 1.427 to −0.857], $P < .001$, $I^2 = 0\%$; 14 days: SMD = −0.922 [CI, −1.264 to −0.582], $P < .001$, $I^2 = 49.1\%$; and 30 days: SMD = −1.886 [CI, −2.919 to −0.853], $P < .001$, $I^2 = 0\%$) with a very low certainty of evidence for pooled results.

DISCUSSION

LPS is an important mediator in the pathogenesis of apical periodontitis by mediating tissue destruction[11,37,38]. This review aimed to obtain information about the reduction of LPS by $Ca(OH)_2$, the most widely used endodontic ICM because of its bactericidal and bacteriostatic effect and high alkalinity[12,13]. The ability of $Ca(OH)_2$ to neutralize endotoxins in root canals when used as an ICM[16–18] can be attributed to its ability to cleave ester-linked hydroxy fatty acid bonds, which greatly affects the biological properties of LPS.

The results of a previous systematic review evaluating the reduction of endotoxins by irrigating substances[39] revealed lower levels of LPS after CMP either with sodium hypochlorite (NaOCl) or CHX at both NaOCl concentrations (1% and 2.5%). In this review, saline solution[31], 2.5% NaOCl[32,34], and 2% CHX[17,19] were reported as irrigating substances. The combination of 2% CHX gel and calcium hydroxide 0.14% (limewater) as an irrigant was the most effective in reducing endotoxins in root canals[16]. However, during CMP, NaOCl and CHX were more effective in reducing bacteria levels than endotoxin numbers[19]. CMP was unable to achieve LPS-free root canals regardless of the chemical auxiliary substances used[39]. Similarly, in this systematic review, it was observed that the use of $Ca(OH)_2$ associated or not to an antimicrobial substance reduced LPS levels although it was unable to free root canals from LPS.

Although some studies showed that the antimicrobial effects of $Ca(OH)_2$ are significantly increased when adding CHX to a paste in clinical[34] and *in vitro*[40,41] studies, others have not observed the same favorable results in clinical[18] and *in vitro* studies[42]. Despite that, certain included studies concluded that $Ca(OH)_2$ combined with 2% CHX gel showed a greater endotoxin reduction than $Ca(OH)_2$ alone[19,32,34].

In this systematic review, a reduction in LPS levels was observed in 7[11,19,31], 14[11,18,33,34], and 30 days[17,35]. However, the 30-day protocol proved to be more effective in reducing intracanal endotoxins.

Techniques for quantifying LPS levels differ in terms of their sensitivity[43]. Both types of chromogenic LAL assays (QCL and KQCL) use a synthetic peptide–peptide nucleic acids substrate that is cleaved by the clotting enzyme, making the solution yellowish[39]. The turbidimetric kinetic assay (TKA) is based on monitoring the conversion of coagulogen to coagulin, which is manifested by an increase in turbidity because of the formation of a gel clot. The concentration of endotoxin is determined based on the strength of the color, which is verified by the optical density (OD) at 405 nm in the chromogenic LAL assay, and at 340 nm in the TKA[39]. The differences in the sensitivity of these assays are caused by the different time points of the progress of the LAL reaction leading to the conversion[38]. The range of sensitivity is 0.1–1 EU/mL for the chromogenic LAL assay and 0.01–100 EU/mL for the TKA[38]. It is well-known that the high sensitivity of the LAL test[44] allows the detection and quantification of endotoxins in different oral sites[45], including root canal infections[19,37]. The type of test used may have an impact in terms of endotoxin quantification[43]. Nevertheless, Chen and Mozier[46] conducted a study comparing 3 endotoxin quantification methods (QCL, KQCL, and TKA) and concluded that these methods are robust and produce comparable results.

The micro-ELISA strip plate provided in the ELISA kit is precoated with an antibody specific to endotoxin[32]. Only those wells that contain endotoxin and horseradish peroxidase–conjugated endotoxin antibody appear blue in color and then turn yellow after the addition of the stop solution[32]. The OD, measured at 450 nm, is proportional to the concentration of endotoxins[32]. This is calculated by comparing the OD of the samples with the standard curve[32]. Because of the different methods of endotoxin quantification, it was only possible to use some studies for the meta-analysis.

Studies with small or insufficient sample sizes are at a higher risk of being underpowered, potentially giving rise to type II errors and null trial outcomes[47]. None of the studies included in this review reported sample size calculations. Almost all of them used 10 samples per group (varying from 10–24). Only 1 study used 8 teeth per group[19]. The small sample sizes of the included studies could be considered as a possible limitation of the present review.

Merely 1 study evaluated $Ca(OH)_2$ alone as an ICM[31]. The other studies used different irrigating substances, which could be a confounding factor. Moreover, the certainty of evidence was very low, which suggests that new clinical studies with better methodological quality, including primary teeth, should be performed using ICM and irrigating substances aiming at the elimination of LPS.

In light of this systematic review, $Ca(OH)_2$ used as an ICM reduces endotoxin levels compared with initial levels found in primary endodontic infection but is unable to eliminate LPS completely. It was also concluded, with very low certainty of evidence, that teeth treated with $Ca(OH)_2$ as the ICM present a greater reduction of mean LPS independent of the irrigant solution.

CONCLUSION

CH reduces endotoxin levels when used as an ICM but is unable to completely eliminate LPS independent of the irrigating solution used, with very low certainty of evidence.

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The authors deny any conflicts of interest related to this study.

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4.3 Artigo 3. Influence of the COVID-19 pandemic on pulp therapy protocols in Pediatric Dentistry practice in Brazil: an observational study

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Influence of the COVID-19 pandemic on pulp therapy protocols in Pediatric Dentistry practice: an observational study

ABSTRACT

Aim: To assess the influence of the COVID-19 pandemic on pulp therapy protocols in primary teeth. **Methods:** In this cross-sectional study, data about the academic formation and professional practice of Brazilian pediatric dentists, pulp therapy protocol used before and during the pandemic were obtained through a self-applied online questionnaire. Descriptive and inferential (Kruskal-Wallis, Chi-square, McNemar, Friedman and Fisher tests) statistical analysis were performed. **Results:** The final sample consisted of 360 respondents from all Brazilian states. Most participants were women (90.83%) and acquired a Pediatric Dentistry degree in both public (n=184, 51.11%) and private institution (48.88%), located in a metropolis (56.94%) more than ten years ago (55%).Overall, the majority of the respondents currently practice Pediatric Dentistry exclusively in private clinics (58.05%). There was a statistically significant increase in the choice of non-instrumental endodontic treatment during the pandemic (McNemar Test, $p<0.001$), with CTZ paste being the most chosen for performing the technique ($\chi 2$ Test $p<0.001$). Following the trend of faster appointments, it could be noted that the number of single visits pulpectomies increased during the pandemic (McNemar Test, $p<0.05$). **Conclusion:** There was a greater tendency to choose non-instrumental endodontic treatment, which corroborates the option of Brazilian pediatric dentists for shorter appointments.

Keywords: Pulp therapy, primary teeth, COVID-19, Clinical Protocols.

INTRODUCTION

The potential nosocomial spread of pathogens, including severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) through oral fluid aerosolization, even in routine procedures (SABINO-SILVA, JARDIM & SIQUEIRA, 2020), represents a significant risk for patients, dentists and oral health teams (VERNON *et al.,* 2021) due to the possibility of inhalation or eye contamination by airborne viruses and bacteria (LEONARD *et al.,* 2020). However, pediatric dentists and endodontists are in a unique situation, as they attend urgent cases such as alveolar dental trauma and dental pain (MARTINHO & GRIFFIN, 2021). The Microbial Contamination Index indicates that endodontic procedures generate significantly larger colony-forming units in microbiological culture from the aerosol produced than restorative procedures (MANARTE-MONTEIROA et al., 2013; MELO *et al*, 2020).

Children infected with SARS-CoV-2 remain almost always asymptomatic or develop milder symptoms, However, they are potential vectors in the spread of the disease (LUO *et al*., 2021). Therefore, due to the chances of finding patients with suspected or confirmed disease, dentists had-to adopt special measures to track their patients, improve infection control measures and follow specific recommendations for dental treatment (MARTINHO & GRIFFIN, 2021) in order to mitigate the risks.

To control the transmission of COVID-19, minimal intervention techniques, in addition to comprehensive preventive oral health measures, must be practiced ensuring safety for the dental team in this unprecedented time (VERSACI *et al.*, 2020; LUO et al., 2021). It is known that a follow period between one patient and another is necessary after the procedure with high aerosol generation - such as the use of a high-speed – to allow the adequate fellow time of these infectious aerosols

from clinical room, respecting the local dental institutions recommendations (INNES *et al*. 2021; EHTEZAZI *et al.* 2021; SHAHDAD *et al.* 2021; LUO *et al*., 2021). To optimize pulp therapy in primary teeth diagnosed with necrosis or irreversible pulpitis, the Non-Instrumental Endodontic Treatment (NIET) - based on the disinfection of the root canal system with antibiotic pastes, without root canal instrumentation - is suggested as an interesting alternative for pulpectomy (SATO *et al.,* 1993; HOSHINO *et al.,* 1996). The antimicrobial activity of these antibiotic pastes is responsible to eliminate the microorganisms present in the root canal system and prevent reinfection. In addition, other advantages of this technique when compared to the conventional one is the lower cost (SHETTY et al., 2020) and less treatment time, important factors mainly in the context of the pandemic.

The COVID-19 pandemic came to speed up processes that were already underway, such as minimally invasive techniques and shorter appointments. Thus, following this purpose of examining the influences of the pandemic, the objective of this study was to assess whether there was a change in endodontic practice in pediatric dentistry during this period.

Materials and methods

Study design

This is an observational, cross-sectional exploratory study carried out through a self-applied online questionnaire broadcasted by social networks (WhatsApp®, Instagram®, Facebook®, Twitter®) and by electronic address. The study was approved by the institutional research ethics committee (5.202.530) and reported following the checklist of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (VON ELM *et al*., 2007).

Sample size determination

For the sample calculation of the required number of Brazilian pediatric dentists, "change in pulp therapy protocol" (yes/no) was considered as main variable (outcome event), while the working sector (public/private/teaching in public university/teaching in private university/postgraduate student) was considered as the grouping variable. The sample size was performed for the Qui-square test, considering the following parameters: $\chi 2$ = 13.7 for “change in pulp therapy protocol”, degrees of freedom = 4% alpha and power 0.01 and 0.99, respectively. A sample size of 232 Pediatric Dentists were estimated. Sample calculation was performed with the aid of Jamovi® (Version 1.6.23, Sydney, Australia) and BioEstat® (Version 5.0, Brazil) software.

Participants and study size

Participants were specialists in pediatric dentistry from all states of Brazil contacted electronically through social networks (WhatsApp®, Instagram®, Facebook®, Twitter®) or electronic address from November 2021 to January 2022.

All potentially respondents were informed about the aim of the research, its benefits and potential risks, and freely agreed to participate by checking a box on the virtual informed consent term.

To participate in the study, respondents would need to have a degree in Pediatric Dentistry. Respondents were not eligible if they did not accept the informed consent or did not work as a pediatric dentist in Brazil. In addition, they would be excluded if they submitted partial answers, revoked their consent, or requested their removal from the study for any reason at any time.

Variables and data sources/measurements

A questionnaire about the COVID-19 pandemic and its influence on pulp therapy protocols in pediatric dentistry was developed and applied electronically to 10 academics in the field of Pediatric Dentistry in order to identify any difficulties in understanding or filling out the questions. The researchers analyzed the responses and made suggestions, such as make the questions more direct, increase the number of answers options and to question about minimally invasive treatment, which were reviewed by the team and accepted if appropriate. Fifteen days later, a new version was applied to the same professionals. The analysis was repeated, no modifications were suggested, and the final questionnaire obtained (Table 1) was inserted into the Survey Monkey® platform and made available to the participants. At the time of filling out, there was no control over the moment or time spent by the participants to fill out the form.

The questionnaire was divided into two blocks: 1) collection of professional information in order to detect the sample profile and 2) endodontic treatment protocol for primary teeth used before and during the pandemic.

The city in which the participants currently work was classified according to the Regions of Urban Influence (IBGE, 2018) publication. This defines urban centers according to the presence of certain equipment and services and the populations attraction from other locations and are classified into: Metropolis, Regional Capitals, Sub-regional Centers, Zone Centers or Local Centers.

Data analysis

Data were tabulated in Microsoft Excel program (Microsoft Corporation, Redmond, WA, USA), and then descriptive analysis of frequencies and non-parametric

comparison tests for independent variables were performed. Using the Jamovi Stats Program (Version 1.6.23, Sydney, Australia), considering a significance level of 5%, the McNemar (for 2 groups) and Friedman (for 3 or more groups) tests were performed to analyze the data of dependent samples (before and during the pandemic), Kruskal-Wallis to compare 3 or more independent groups and $\chi 2$ (Qui-Square) test was used for bivariate comparisons, applying Fisher's exact test when appropriate.

Informative material elaboration

Considering the wide variety of non-instrumental endodontic treatment protocols present in the literature, a multimodal tool on the technique was prepared based on scientific literature and evaluated by researchers of pulp therapy on primary teeth and post-graduate Dentistry students unaware with the technique. After data collection, this tool was sent independently to the participants, through the email informed in the study.

RESULTS

A total of 576 questionnaires were returned. After applying the eligibility criteria, 216 participants were excluded from the sample for not answering the questionnaire completely. Considering the 360 valid returned questionnaires, most participants were women (n=327, 90.83%) and acquired a Pediatric Dentistry degree in both public (n=184, 51.11%) and private institution (n=176, 48.88%), located in a metropolis (n= 205, 56.94%) more than ten years ago (n=198, 55%). Overall, the most part of the respondents currently practice Pediatric Dentistry exclusively in private clinics (n=209, 58.05%) and follow a specific infection control protocol (n=343, 95.27%) (Table 2).

Regarding the dental care of patients during the pandemic, it was not possible to assess an influence between the alteration in patient flow and change in the severity of cases (χ2 Test, p=0.300). Descriptively, when comparing the number of consultations before and after the pandemic, 63.33% (n=228) reported a decrease in the number of patients, while 14.16% (n=51) noted an increase. However, 22.5% (n=81) did not notice any difference in attendance per day. On the other hand, 64.16% (n=231) of the specialists noticed a change in the needs/severities of the cases, reporting an increase in the number of cases requiring more invasive interventions (n=177, 49.16%) and in the number of urgent situations (n=113, 31.38%). However, this also had no influence on the choice of treatment during the pandemic (χ2 Test, p=0.796).

Another perception of most respondents was the change in treatment plan caused by the COVID-19 pandemic (n=204, 56.66%), with an increase in minimally invasive procedures to avoid generation of aerosols (n=150, 41.66%), in extractions (n-65, 18.05%) and in virtual consultations (teledentistry) for follow-ups (n=48, 13.33%).

About the pulp therapy protocol, 75% (n=270) reported that there were no changes, but those who changed their protocols opted for the non-instrumental technique (n=132; 36.66%) were basically in an attempt to follow a minimally invasive trend (n=81, 22.5%) or for a treatment option with less chair time (n=64, 17.77%) (Kruskal Wallis, $p<0.05$).

It was possible to visualize the influence of the working sector on the type of procedure chosen in cases of pulp therapy before and during the pandemic (χ2 Test, $p<0.05$). Before the pandemic, in general, 77.5% (n=279) of pediatric dentists opted for conventional endodontic treatment, compared with 18.61% (n=67) who chose non-instrumental endodontic (NIET) (Table 3). Looking deeply, it is possible to see

that 42.6% of responding pediatric dentists that works in the public service opted for the NIET during the pandemic, compared to 38.3% in the private sector and 37.8% of academics from private universities ($p<0.05$) (Table 4). It also could be seen an influence of the working sector with the change in the pulp therapy protocol ($\chi 2$ Test, $p<0.005$), with universities (Public, 41.5%; Private, 37.8%) being the sectors that most changed their protocols.

~~Moreover, the administrative character of the post-graduation institution did not influence the change in the pulp therapy protocol ($\chi 2$ Test, $p=0.223$) neither in the choice of the best treatment for primary teeth with irreversible inflammation or pulp necrosis during pandemic ($\chi 2$ Test, $p=0.095$)~~

For comparisons involving participants who operated in more than one city, the classification of the city with the highest hierarchical level was considered. Four of the mentioned cities could not be identified due to typo errors by the respondents and were not considered in the analyzes. It was observed that the hierarchical level of the participants' cities of activity did not influence the change of pulp therapy protocol neither the choice of treatment for primary teeth with pulp involvement (Kruskal Wallis, $p>0.05$).

Comparing the number of sessions for endodontic treatment of posterior deciduous teeth before and during the COVID-19 pandemic, it could be noted that the number of single appointments increased during the Pandemic (McNemar Test, $p<0.001$) (Table 5). Nonetheless, considering multiple sessions, the most commonly used intracanal medication during the pandemic was calcium hydroxide (n=37, 10.27%) followed by camphorated paramonochlorophenol (n=23, 6.38%).

There was no statistically significant difference in the choice of pulp therapy protocol before and during the pandemic (Friedman Test, $p=0.317$). However, analyzing

each procedure individually (before and during the pandemic), there was a significant increase in the choice of non-instrumental endodontic treatment during the pandemic (McNemar Test, p<0.001). Of the 134 professionals who reported using NIET during the pandemic, only 66 had used this technique before. (Table 6). However, this increase in the use of NIET was not influenced by the change in the severity of cases (χ2 Test, p=0.647).

Analyzing the pediatric dentists who opted for NIET (n=195), it is possible to observe that the majority who chose to change the pulp therapy protocol during the pandemic used the CTZ paste (n=157, 80.51%; χ2 Test p<0.001), while 8.71% (n=17) opted for triantibiotic pastes. Of the 21 who reported using other pastes (10.76%), one said that use CTZ paste only in difficult cases (4.76%), six used Guedes Paste (28.57%), six chose calcium hydroxide-based pastes (28.57%), four preferred Feapex (19.04%), one ZOE (4.76%) and one still reported using photodynamic therapy (4.76%). However, the choice of the paste material type was not influenced by the administrative character of the institution (χ2 Test, p=0.142), nor by the working sector (χ2 Test p=0.145).

Regarding restorative materials, it could be observed that 43.88% (n=158) pediatric dentists chose to use glass ionomer cement (GIC) as the final restorative material during the pandemic, compared to the amount of 28.88% (n=104) who used GIC prior to the pandemic period, which is considered a statistically significant increase (McNemar test, p<0.001).

DISCUSSION

During the COVID-19 pandemic, Dentistry needed to intensify and adapt its care protocols due to the risk of dissemination and cross-contamination of the virus in the

clinical environment, mainly by aerosols generated during dental procedures (Deana et al., 2021; CDC 2021). With the outbreak of COVID-19 and the restrictive measures promoted by the World Health Organization (WHO), routine appointments and previously planned and scheduled clinical procedures had to be postponed (Moraes et al., 2020). As a result, changes in treatment plans were expected and now that the restrictive measures have eased, previously programmed pulp therapies became extractions, composite resin restorations became atraumatic restorative treatment (ART), follow-up appointments became virtual (teledentistry) and a trend towards minimally invasive procedures was seen.

In addition, the COVID-19 pandemic has impacted health services and systems worldwide (WHO, 2020). The need to guarantee and prioritize assistance to the sick and the concern with contagion outlined a framework for action that reflected in all health areas. Consequently, there was an increase in more complex cases. What was programmed for a simple restoration ended up turning into a pulp therapy. In fact, this was expected, since many children spent almost the entire period of the pandemic without any dental care (Cunha et al., 2021). In this scenario, it is important to understand how the pandemic influenced the practice of pulp therapy in cases of primary teeth with irreversible pulp involvement. For this, an online questionnaire was carried out, conducted in the form of a census, which, although it depends on the willingness of the subject to respond, is the best way to investigate the national panorama.

Considering the difficulty of complete disinfection of the root canal system of deciduous teeth, the need for faster treatments and greater spacing between appointments, the Non-Instrumental Endodontic Treatment (NIET) technique was

proposed (Hoshino et al., 1989) as an alternative to the conventional technique, with the aim of disinfecting the pulp and periapical tissues, in a faster and simpler way (Takushige et al., 2004; Ali, Moral & Quader, 2017). The technique uses pastes obtained by the association of antibiotics, applied on the pulp floor and at the entrance of the canals, without the need for instrumentation of the root canals (Nakornchai, Banditsing & Visetratana, 2010). By presenting a simpler protocol, not requiring canal instrumentation, NIET reduces the time and costs involved in the classic pulpectomy technique (Oliveira E Costa, 2006; Shetty, Geethanjali & Hegde, 2020), making it an interesting alternative during the COVID-19 pandemic. Despite the fact that most respondents reported that they did not change the protocol they were performing before the pandemic, we could perceive an increase in the preference for the non-instrumental technique during the pandemic, mainly due to the need of less chair time and to adopt a minimally invasive therapy.

Concerning the pastes, despite the vast majority reported the use of antibiotic mixtures, especially the CTZ paste, - the most used in Latin America (Calixto-Chanca et al., 2014; Daher et al., 2015; Siegl et al., 2015; De Deus et al., 2016) - a lack of knowledge was seen regarding the choice of the suitable paste for this technique. Many respondents reported using iodoformed based pastes such as Feapex® (Fórmula e Ação, São Paulo, SP, Brazil) and Guedes-Pinto and also calcium hydroxide based pastes, which are not recommended in the literature for this technique, since they do not include an antibiotics association.

The non-instrumental technique using CTZ paste is also a potential alternative for the endodontic treatment of primary teeth in the Brazilian public health perspective. In addition of being a faster, simpler, and minimally invasive technique, it has low-

cost antibiotic components when compared to other filling materials with antimicrobial action (Denari, 1996), allowing children in vulnerable situations to have access to dental treatment that allows keeping the tooth in the oral cavity for longer.

Another technique whose primary objective is to eliminate microorganisms and prevent reinfection, creating a favorable environment for the healing of periradicular tissues and reducing pain and discomfort in children is the conventional pulpectomy. However, even after proper and thorough cleaning/shaping of the root canal, it is impossible to obtain a bacteria-free root canal system (Faria et al., 2005). The idea behind multiple sessions in pulpectomy is that intracanal medication would act reducing the microbial load in primary teeth (Gutmann et al., 1992), with calcium hydroxide being considered the gold standard for this purpose. However, during the pandemic, it could be noted that many pediatric dentists opted for a smaller number of consultations, preferring pulpectomy in a single session in order to optimize care ~~and prevent children from leaving the house more often~~. On the other hand, others still kept multiple session appointments using calcium hydroxide as dressing, most likely due to the fact that the new care guidelines suggest shorter and more spaced appointments for applying infection control measurements in the operating room between patients.

As for the material chosen for the final restoration before and during the pandemic, an increase in the use of glass ionomer cement was noted, in association or not with other materials, such as composite resin or stainless-steel crowns. Generally, a wide variety of materials is used for restoring primary teeth after pulp therapy (Sousa et al., 2020), and GIC alone is not the first option for final restoration in studies evaluating pulp therapy performance, although there is evidence supporting its use

on occlusal restorations (Chisini et al., 2018). Although this may be related to the ease of the technique, reducing the service time, it may compromise the longevity of more complex restorations.

CONCLUSION

In general, the COVID-19 pandemic did not influence pulp therapy protocols in necrotic primary teeth, although a notable increase for the choice of NIET was observed in this survey both in the public and private sectors, which corroborates the option of Brazilian pediatric dentists for shorter appointments. However, pediatric dentists who decided for conventional endodontic treatment reduced the number of appointments, prioritizing pulpectomy in a single session.

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Table 1 - Electronic questionnaire applied on the Survey Monkey platform

Block 1: Professional information
1) Your email:
2) Gender: (1) male (2) female (3) prefer not to declare
3) Age: ____ years
4) Graduation time: _____years
5) Specialization: _____years
( ) I'm not a pediatric dentist
6) Specialization training university: ( ) public ( ) private
7) State you work as a pediatric dentist?
( ) Acre ( ) Alagoas ( ) Amapá ( ) Amazonas ( ) Bahia ( ) Ceará ( ) Federal District ( ) Espírito Santo ( ) Goiás ( ) Maranhão ( ) Mato Grosso ( ) Mato Grosso do Sul ( ) Minas Gerais ( ) Pará ( ) Paraíba ( ) Paraná ( ) Pernambuco ( ) Piauí ( ) Rio de Janeiro ( ) Rio Grande do Norte ( ) Rio Grande do Sul ( ) Rondônia ( ) Roraima ( ) Santa Catarina ( ) São Paulo ( ) Sergipe ( ) Tocantins
8) In which city do you work?
9) Sector in which you practice: ( ) public clinic ( ) private clinic ( ) teaching at a public university ( ) teaching at a private university
Block 2: Endodontic care protocol before, during and after the pandemic
10) Did the COVID-19 pandemic affect the number of patients in your practice when compared to the same time before the pandemic? The flow of patients:
( ) Increased ( ) Decreased ( ) I didn't notice the difference
11) Did the COVID-19 pandemic change the needs/severity of cases in your practice when compared to the same time before the pandemic?
( ) There was a difference. Which? ( ) The number of cases requiring more invasive procedures has increased ( ) The number of preventive treatments decreased ( ) The number of emergencies increased ( ) I didn't notice the difference
12) Did the COVID-19 pandemic change the planning of cases in your practice when compared to the same time before the pandemic?
( ) yes ( ) no
13) If you answered "yes" to the previous question, what schedule changes have been made?
( ) The programmed pulp therapies turned into extraction ( ) The programmed resins became atraumatic restorative treatment (TRA) ( ) There was no change ( )) Other (specify)
14) Before the pandemic, did you use to ask for x-rays, or did you do it in an office?
( ) Performed the radiography in the office ( ) Referred to radiological centers ( ) I do not have a radiography device in the office
15) During the pandemic, you have chosen to:
( ) Carry out the radiography in the office ( ) Forward to radiological centers ( ) I do not have a radiography device in the office

16) Has your pulp therapy protocol changed?

( ) No.

( ) Yes. What is the reason? ( ) Financial ( ) lack of material availability ( ) Option for procedures with less chair time ( ) follow a minimally invasive trend

17) Before the pandemic, which technique did you use to treat primary teeth with irreversible inflammation or pulp necrosis?

( ) Root canal instrumentation (conventional endodontic treatment or pulpectomy) ( ) No root canal instrumentation ( ) extraction ( ) I do not do endodontics in primary teeth

18) During the pandemic, which technique have you preferred for these cases?

( ) Root canal instrumentation ( ) No root canal instrumentation ( ) extraction ( ) I do not do endodontics in primary teeth

19) If you chose the non-instrumental technique, what material did you use?

( ) Triantibiotic paste ( ) CTZ paste ( ) Other. Which?

20) How often do you use the rubber dam during pulp therapy:

Before the pandemic:

( ) Always ( ) Often ( ) Sometimes ( ) Rarely ( ) Never

During the pandemic:

( ) Always ( ) Often ( ) Sometimes ( ) Rarely ( ) Never

Intends to keep after the pandemic:

( ) Always ( ) Often ( ) Sometimes ( ) Rarely ( ) Never

21) Before the pandemic, in how many sessions do you typically perform pulp therapy on anterior teeth? ( ) Single session ( ) Multiple sessions

22) Before the pandemic, in how many sessions do you typically perform pulp therapy on posterior teeth? ( ) Single session ( ) Multiple sessions

23) During the pandemic, in how many sessions do you typically perform pulp therapy on anterior teeth? ( ) Single session ( ) Multiple sessions. What intracanal medication do you use?

24) During the pandemic, in how many sessions do you typically perform pulp therapy on posterior teeth? ( ) Single session ( ) Multiple sessions. What intracanal medication do you use?

25) What material do you use for the final restoration?

Before the pandemic:

( ) Glass ionomer cement (GIC) ( ) Composite resin ( ) CIV + Stainless steel crown ( ) CIV + Zirconia crown ( ) Celluloid crown ( ) CIV + resin ( ) Others (specify)

During the pandemic:

( ) Glass ionomer cement (GIC) ( ) Composite resin ( ) CIV + Stainless steel crown ( ) CIV + Zirconia crown ( ) Celluloid crown ( ) CIV + resin ( ) Others (specify)

Table 2 - Summary of 360 valid answers on questions applied to all participants

Variable	N (%)
Sex	
Female	327 (90.83)
Male	33 (9.16)
I prefer not to declare	0 (0)
Institution of Specialization	
Private	176 (48.88)
Public	184 (51.11)
Time since specialization	
≤ 1 year	28 (7.77)
1 to 5 years	80 (22.22)
6 to 10 years	50 (13.88)
> 10 Years	198 (55)
No information	4 (1.11)
National distribution (per geographic region)	
North	23 (6.38)
Northeast	47 (13.05)
Center-West	30 (8.33)
Southeast	199 (55.27)
South	61 (16.94)
City of activity *	
Metropolis	205 (56.94)
Regional Capital	94 (26.11)
Sub-regional Center	46 (12.77)
Zone Center	10 (2.77)
Local Center	25 (6.94)
Sector of activity	
Public Clinic	54 (15)
Private Clinic	209 (58.05)
Public University	41 (11.38)
Private University	45 (12.50)
Postgraduate student	11 (3.05)

Table 3 - Chi-Square Test to assess the relationship between the workplace and the type of treatment chosen for teeth with pulp inflammation or necrosis prior to the pandemic

Contingency Tables

Contingency Tables

Working sector		Endodontic treatment (before the COVID-19 pandemic)				Total
		NIET	Pulpectomy	No endodontics on primary teeth	Dental extraction	
Private Clinic	Observed	37	166	5	1	209
	% within row	17.7%	79.4%	2.4%	0.5%	100.0%
Teaching in Public University	Observed	5	35	1	0	41
	% within row	12.2%	85.4%	2.4%	0.0%	100.0%
Public Clinic	Observed	15	36	2	1	54
	% within row	27.8%	66.7%	3.7%	1.9%	100.0%
Teaching in Private University	Observed	10	34	1	0	45
	% within row	22.2%	75.6%	2.2%	0.0%	100.0%
Postgraduate student	Observed	0	8	3	0	11
	% within row	0.0%	72.7%	27.3%	0.0%	100.0%
Total	Observed	67	279	12	2	360
	% within row	18.6%	77.5%	3.3%	0.6%	100.0%

χ^2 Tests

	Value	df	p
χ^2	29.0	12	0.004
N	360		

Table 4 - *Chi-Square Test to assess the relationship between the workplace and the type of treatment chosen for teeth with pulp inflammation or necrosis during the pandemic*

Contingency Tables

Contingency Tables

WORKING SECTOR		Endodontic treatment (during the COVID-19 pandemic)				Total
		NIET	Dental extraction	Pulpectomy	No endodontics on primary teeth	
Private Clinic	Observed	80	4	118	7	209
	% within row	38.3%	1.9%	56.5%	3.3%	100.0%
Teaching in Public University	Observed	11	5	24	1	41
	% within row	26.8%	12.2%	58.5%	2.4%	100.0%
Public Clinic	Observed	23	2	27	2	54
	% within row	42.6%	3.7%	50.0%	3.7%	100.0%
Teaching in Private University	Observed	17	2	25	1	45
	% within row	37.8%	4.4%	55.6%	2.2%	100.0%
Postgraduate student	Observed	1	0	7	3	11
	% within row	9.1%	0.0%	63.6%	27.3%	100.0%
Total	Observed	132	13	201	14	360
	% within row	36.7%	3.6%	55.8%	3.9%	100.0%

χ^2 Tests

	Value	df	p
χ^2	31.3	12	0.002
N	360		

Table 5 - McNemar test to evaluate the type of treatment chosen for teeth with pulp inflammation or necrosis before and during the pandemic

Paired Samples Contingency Tables

Contingency Tables

Endodontic appointment (before pandemic)		Endodontic appointment (during pandemic)		Total
		Multiple session	Single session	
Multiple session	Count	106	41	147
	% within row	72.1%	27.9%	
Single session	Count	7	206	213
	% within row	3.3%	96.7%	
Total	Count	113	247	360
	% within row	31.4%	68.6%	

McNemar Test

	Value	df	p
χ^2	24.1	1	<.001
N	360		

Table 6 - McNemar test to evaluate the choice of the NIET as the treatment chosen for teeth with pulp inflammation or necrosis before and during the pandemic

Paired Samples Contingency Tables

Contingency Tables

NIET (before)	NIET (during)		Total
	Yes	No	
Yes	66	1	67
No	68	225	293
Total	134	226	360

McNemar Test

	Value	df	p
χ^2	65.1	1	<.001
N	360		

5. CONSIDERAÇÕES FINAIS

A terapia pulpar em dentes decíduos está voltada ao tratamento de dentes acometidos por cárie ou trauma, com a finalidade de conservar a vitalidade pulpar sempre que possível, de forma a fornecer saúde bucal às crianças por meio da manutenção da integridade da dentição e dos tecidos de suporte. (AAPD, 2020)

Apesar da pulpectomia ser uma técnica consolidada e utilizada há décadas, ainda hoje não existe um protocolo “padrão” com um material obturador que atenda a todas as qualidades desejáveis de um material obturador. Através da revisão bibliométrica foi possível observar uma grande variedade de técnicas e pastas obturadoras e, na maioria dos casos, a escolha tem sido deixada para o profissional. Foi observada a ausência de estudos clínicos multicêntricos sobre procedimentos de pulpectomia em dentes decíduos. Além de estudos que mensurem as questões psicométricas envolvendo crianças, como percepção de dor, ansiedade odontológica e estresse psicológico. Curiosamente, também podemos notar que nenhum estudo que avaliou o custo-efetividade foi recuperado.

Outro grande debate no que se refere ao tratamento endodôntico de dentes decíduos é no que concerne ao manejo de dentes com necrose pulpar. Alguns dos questionamentos mais comuns são: (1) Fazer a técnica convencional ou a não instrumental (TENI)?; (2) Fazer o tratamento em múltiplas sessões ou em sessão única?; (3) caso a opção seja em múltiplas sessões, qual a melhor medicação intracanal a ser utilizada?.

Essas são perguntas que ainda estão no processo de serem respondidas. Levando isso em consideração, foi feita uma revisão sistemática para avaliar se a medicação intracanal considerada padrão ouro, o hidróxido de cálcio, é eficaz na inibição das

endotoxinas - presentes em todas as bactérias gram-negativas – predominantemente encontradas em casos de necrose pulpar. Após revisão sistemática e metanálise, apenas estudos em dentes permanentes foram recuperados e pôde-se observar uma redução dos níveis de LPS encontrados, porém não houve uma completa eliminação, mostrando mais uma vez a necessidade de mais estudos sobre o assunto, principalmente em dentes decíduos.

Por fim, estamos vivendo um momento muito difícil e de muitas mudanças proporcionadas pela pandemia de COVID-19. É preciso levar em consideração que modificações dos protocolos da prática odontológica são necessárias, especialmente em Odontopediatria, uma vez que se sabe que as crianças infectadas com o vírus podem permanecer assintomáticas ou apresentar sintomas leves e/ou inespecíficos (Lamberghini et al., 2021). Diretrizes foram aprovadas para que o atendimento odontopediátrico possa ser otimizado e infecções possam ser prevenidas ou controladas (AAPD, 2020).

Ademais, houve uma grande redução do número de atendimentos odontológicos realizados durante a pandemia (Chisini et al., 2021; Alzahrani et al., 2021; Üstün et al., 2021; Fux-Noy et al., 2021) como consequência do isolamento social e das recomendações sanitárias e de saúde, além do receio e preocupação dos pais em levar seus filhos para atendimento (Sun et al. 2020). Como consequência, foi possível ver um aumento na complexidade dos casos e na quantidade de urgências odontológicas (Meng et al., 2020).

Levando isso em consideração, muitos odontopediatras sentiram a necessidade de se reinventarem, mudando os planejamentos dos casos, priorizando técnicas minimamente invasivas e com um menor tempo de cadeira. Com isso, pôde-se

notar uma tendência pela busca do tratamento endodôntico não instrumental justamente por ser uma técnica mais rápida e barata.

Por fim, mas não menos importante, apesar de muitos estudos publicados na área de endodontia em dentes decíduos, ainda há um campo a ser explorado como apontado na conclusão dos 3 artigos.

6. CONCLUSÕES

Após realizar as revisões bibliométrica e sistemática da literatura e, investigar a influência da pandemia de COVID-19 na prática clínica em Odontopediatria, foi possível concluir que:

- Há uma falta geral de estudos clínicos multicêntricos sobre procedimentos de pulpectomia em dentes decíduos. A maioria dos estudos foi publicada em países em desenvolvimento, denotando um claro viés nas opções de tratamento oferecidas para crianças em todo o mundo, uma vez que o acesso aos serviços de anestesia geral em países desenvolvidos favorece a exodontia de dentes com comprometimento pulpar. A maioria dos estudos selecionados relatou o uso de instrumentação manual com hipoclorito de sódio como solução de irrigação e preenchimento com óxido de zinco / eugenol, porém identificou-se uma tendência nas pesquisas científicas para o uso de instrumentação mecanizada e pastas de obturadoras mais biocompatíveis e eficazes.

- A revisão sistemática revelou, com a certeza da evidência muito baixa, que o hidróxido de cálcio reduz os níveis de endotoxinas quando usado como medicação intracanal em dentes permanentes, mas foi incapaz de eliminar completamente a LPS, independente estar ou não associado com alguma solução irrigante.

- De maneira geral, a escolha do tipo de protocolo de pulpectomia não apresentou diferença estatisticamente significante na comparação antes e durante a pandemia, porém, olhando para a escolha do TENI isoladamente, foi possível perceber um aumento do uso desta técnica durante a pandemia. Além disso, houve influência do setor de atuação na escolha do tratamento dos casos de terapia pulpar antes e durante a pandemia, evidenciando um aumento da busca pelo TENI tanto no setor

público quanto no privado. Porém, mesmo os odontopediatras que continuam optando pelo tratamento endodôntico convencional optaram pela redução no tempo e número de consultas, priorizando a pulpectomia em uma única sessão.

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8. ANEXOS

Anexo A – Parecer do comitê de ética sobre o terceiro estudo

UFRJ - HOSPITAL UNIVERSITÁRIO CLEMENTINO FRAGA FILHO DA UNIVERSIDADE FEDERAL DO RIO DE JANEIRO / HUCFF-UFRJ

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Influência da pandemia de COVID-19 nos protocolos de terapia pulpar na prática da Odontopediatria

Pesquisador: Natália Rocha Bedran

Área Temática:

Versão: 2

CAAE: 51824021.7.0000.5257

Instituição Proponente: UNIVERSIDADE FEDERAL DO RIO DE JANEIRO

Patrocinador Principal: Universidade Federal Do Rio de Janeiro

DADOS DO PARECER

Número do Parecer: 5.202.530

Apresentação do Projeto:

Protocolo 227-21. Respostas recebidas em 02/11/2021.

As informações colocadas nos campos denominados "Apresentação do Projeto", "Objetivo da Pesquisa" e "Avaliação dos Riscos e Benefícios" foram retiradas do arquivo intitulado "PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1816508.pdf ", postado em 02/11/2021.

Objetivo da Pesquisa:

Investigar, através de um questionário eletrônico, se ocorreram mudanças nos protolocos de terapia pulpar em dentes decíduos durante a pandemia

Avaliação dos Riscos e Benefícios:

Riscos:

Considerando-se que não se justifica submeter seres humanos a riscos inutilmente e que toda pesquisa envolvendo seres humanos envolve algum

tipo e grau de risco (Res. CNS n.º 466/12), o presente estudo tem como prioridade se adequar, do ponto de vista metodológico, para que se torne

útil e eticamente aceitável, minimizando os riscos aos sujeitos de pesquisa. Assim, os riscos

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envolvidos nesta pesquisa são característicos do
ambiente virtual, relacionados a potencial violação da confidencialidade de dados do respondente, em função das limitações próprias das
tecnologias utilizadas. Neste sentido, os pesquisadores comprometem-se a minimizar estes riscos através da utilização do software de questionário
(Google Forms®) empenhado a cumprir com as leis e regulamentos vigentes, de acordo com o Regulamento geral de proteção de dados (GDPR) e
a Lei de Privacidade do Consumidor da Califórnia (CCPA).
Além disso, apenas a pesquisadora responsável terá acesso as respostas através de seu login e senha no site, sendo a senha modificada
frequentemente. Os dados pessoais dos participantes que poderiam ser identificados, como e-mail, não serão divulgados, garantindo o anonimato
dos participantes. Ademais, as respostas não serão utilizadas como forma de avaliação de conhecimento. Uma vez concluída a coleta de dados,
será feito o download dos dados coletados para um dispositivo eletrônico local, apagando todo e qualquer registro de qualquer plataforma virtual,
ambiente compartilhado ou "nuvem".
Benefícios:
Com essa pesquisa visa-se entender as mudanças que a pandemia de COVID-19 trouxe para o atendimento odontológico, com isso, destaca-se
como benefício a contribuição ao estudo da terapia pulpar em dentes decíduos, ampliação e disseminação do conhecimento acerca desta temática.
Colaborando, portanto, para o aprimoramento do desempenho de pulpectomias em dentes decíduos e na obtenção de maiores frequências de
sucesso

Comentários e Considerações sobre a Pesquisa:
Trata-se de respostas às pendências emitidas no parecer n. 5.074.481, de 01/11/2021.

Considerações sobre os Termos de apresentação obrigatória:
Vide item "Conclusões ou Pendências e Lista de Inadequações".

Recomendações:

Vide item "Conclusões ou Pendências e Lista de Inadequações".

Conclusões ou Pendências e Lista de Inadequações:

1. Quanto às declarações postadas:

1.1 A Conep solicita que não se utilize assinatura digitalizada, em formato de imagem, nos documentos. A assinatura eletrônica ainda não é aceita por inadequação dos sistemas utilizados. Desse modo, é aceitável a assinatura com certificação digital ou por documento assinado manualmente e posteriormente digitalizado. Solicita-se adequação.

Resposta: Os documentos "Carta de apresentação", "Compromisso do pesquisador", "Lattes", "Declaração de responsabilidade da Instituição", "Folha de rosto" foram adequados de acordo com as orientações.

Análise: Pendência atendida.

2. 2. Quanto ao Projeto de Pesquisa (arquivos intitulados "PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1816508.pdf" e "Protocolo_CEP.docx", postados em 14/09/2021 e 08/09/2021, respectivamente):

2.1 Em relação à submissão do protocolo:

2.1.1 Solicita-se que conste, na metodologia do Projeto Detalhado, a explicação de todas as etapas/fases não presenciais do estudo, enviando, inclusive, os modelos de formulários, termos e outros documentos que serão apresentados ao candidato a participante de pesquisa e aos participantes de pesquisa (Carta Circular nº 1/2021-CONEP/SECNS/MS, datada em 03/03/2021).

Resposta: Todas as etapas desse estudo serão realizadas de forma não presencial visto que esse é um questionário eletrônico a ser disponibilizado na plataforma Google Forms®. O que serão

apresentados aos candidatos será o seguinte convite através das redes sociais WhatsApp Inc® (WhatsApp Inc. Menlo Park, Califórnia, EUA), Facebook Inc® (Facebook Inc. Menlo Park, Califórnia, EUA) e Instagram (Menlo Park, Califórnia, EUA): "Olá! Estamos desenvolvendo uma pesquisa junto à Equipe do Programa de Pós-graduação em Odontopediatria, no Departamento de Ortodontia e Odontopediatria da UFRJ. No início do ano de 2020, fomos acometidos pela propagação do vírus SARS-CoV-2 e, infelizmente ainda estamos vivenciando a pandemia da COVID-19. Diante disso, estamos realizando uma pesquisa destinada aos profissionais que atuam na ODONTOPEDIATRIA, para avaliar a influência da pandemia da COVID-19 na sua prática clínica. As suas respostas serão utilizadas de forma anônima. Agradecemos a colaboração.", de acordo com as diretrizes presentes na Carta Circular no 1/2021-CONEP/SECNS/MS, datada em 03/03/2021.

Posteriormente à elaboração do questionário, 10 professores e alunos de doutorado em odontopediatria, da FO-UFRJ, que aceitarem participar da pesquisa, irão realizar a avaliação do questionário. O questionário, disponibilizado de forma online na Plataforma Google Forms®, será enviado individualmente aos professores e doutorandos, - de acordo com as diretrizes presentes na Carta Circular no 1/2021-CONEP/SECNS/MS, datada em 03/03/2021 - através de um link junto com o convite:

"Olá professor X,

Aqui é a Natália Bedran, aluna de doutorado em Odontopediatria da professora Laura Primo. Estamos desenvolvendo um projeto de pesquisa intitulado: "Influência da pandemia de COVID-19 nos protocolos de terapia pulpar na prática da Odontopediatria". O nosso questionário é composto por 35 perguntas que visam: (1) detectar o perfil do profissional; (2) avaliar as formas de biossegurança adotadas durante atendimento e (3) avaliar se houve alteração na prática clínica endodôntica em Odontopediatria. Solicitamos a sua ajuda para avaliar se o questionário está claro e de fácil entendimento ou se tem alguma pergunta que possa gerar alguma dúvida. Qualquer alteração e sugestão será bem vinda!!
Só para contextualizar, os objetivos do trabalho são:
• Investigar, através de um questionário eletrônico, se ocorreram mudanças nos protocolos de

terapia pulpar em dentes decíduos durante a pandemia.
• Comparar as características dos protocolos utilizados durante a pandemia com protocolos estabelecidos previamente na literatura odontopediátrica.
• Investigar os motivos para possíveis mudança de protocolo.
Muito obrigada,
Natália Bedran."

Análise: Pendência atendida.

2.1.2 Todos os documentos referentes à pesquisa em ambiente virtual devem mencionar e seguir as diretrizes presentes na Carta Circular nº 1/2021-CONEP/SECNS/MS, datada em 03/03/2021. Solicita-se adequação.

Resposta: Foi acrescentado na metodologia no item 4.1: Visando o entendimento sobre os protocolos clínicos relacionados à terapia pulpar em dentes decíduos, o desenvolvimento do estudo se dará em três etapas: (1) elaboração do questionário e avaliação do questionário; (2) aplicação do questionário e (3) produção e envio do produto técnico. Todas as etapas seguirão as diretrizes presentes na Carta Circular no 1/2021-CONEP/SECNS/MS, datada em 03/03/2021. E após cada convite foi acrescentado que foi seguindo as orientações da Carta Circular.

Análise: Pendência atendida.

2.2. Quanto ao cronograma do estudo: Solicita-se inserir declaração do pesquisador apresentando cronograma atualizado de forma a descrever a duração das diferentes etapas da pesquisa, com compromisso explícito do pesquisador de que o estudo será iniciado somente a partir da aprovação pelo Sistema CEP/Conep (Norma Operacional CNS nº 001 de 2013, item 3.3.f).

Resposta: Declaração inserida no arquivo "CRONOGRAMA":
Após aprovação do Comitê de Ética do Hospital Universitário Clementino Fraga Filho (HUCFF/UFRJ), será feita uma busca ativa no Google e nas redes sociais pelos odontopediatras nos meses de

dezembro e janeiro em todos os estados brasileiros em ambos setores público e privado. A medida que forem sendo obtidas as formas de contato, serão enviados os convites para os candidatos a pesquisa. A participação será voluntária mediante assinatura virtual do Termo de Consentimento Livre e Esclarecido (TCLE). Nos meses de janeiro, fevereiro e março será feita a análise dos dados obtidos. Após os resultados, será iniciada a redação do manuscrito em fevereiro e março e a submissão do artigo em março

Análise: Pendência atendida.

Considerações Finais a critério do CEP:

1.De acordo com o item X.1.3.b, da Resolução CNS n. 466/12, o pesquisador deverá apresentar relatórios semestrais - a contar da data de aprovação do protocolo - que permitam ao Cep acompanhar o desenvolvimento dos projetos. Esses relatórios devem ser assinados pelo pesquisador responsável e conter as informações detalhadas - naqueles itens aplicáveis - nos moldes do relatório final contido no Ofício Circular n. 062/2011:
<http://conselho.saude.gov.br/web_comissoes/conep/aquivos/conep/relatorio_final_encerramento.pdf>, bem como deve haver menção ao período a que se referem. As informações contidas no relatório devem ater-se ao período correspondente e não a todo o período da pesquisa até aquele momento. Para cada relatório, deve haver uma notificação separada. A submissão deve ser como Notificação (consultar pág. 69 no arquivo intitulado "1 - Manual Pesquisador - Versão 3.2, disponível no endereço http://plataformabrasil.saude.gov.br/login.jsf. Anexar em arquivo com recurso "copiar e colar".

2. Eventuais emendas (modificações) ao protocolo devem ser apresentadas de forma clara e sucinta, identificando-se, por cor, negrito ou sublinhado, a parte do documento a ser modificada, isto é, além de apresentar o resumo das alterações, juntamente com a justificativa, é necessário destacá-las no decorrer do texto (item 2.2.1.H.1, da Norma Operacional CNS nº 001 de 2013).

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

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Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1816508.pdf	02/11/2021 06:57:36		Aceito
Outros	Carta_resposta.docx	02/11/2021 06:57:06	Natália Rocha Bedran	Aceito
Declaração de Instituição e Infraestrutura	Declaracao_instituicao.pdf	02/11/2021 06:55:47	Natália Rocha Bedran	Aceito
Cronograma	cronograma.docx	02/11/2021 06:54:11	Natália Rocha Bedran	Aceito
Projeto Detalhado / Brochura Investigador	Protocolo_CEP.docx	02/11/2021 06:53:51	Natália Rocha Bedran	Aceito
Outros	compromisso_do_pesquisador_com_assinatura.pdf	02/11/2021 06:52:09	Natália Rocha Bedran	Aceito
Declaração de Pesquisadores	carta_de_apresentacao_com_assinatura.pdf	02/11/2021 06:50:55	Natália Rocha Bedran	Aceito
Outros	Pesquisadores_Participantes_do_estudo_e_respectivos_links_para_Curriculo_Lattes_.pdf	02/11/2021 06:50:27	Natália Rocha Bedran	Aceito
Folha de Rosto	folhaDeRosto_com_assinatura.pdf	02/11/2021 06:49:31	Natália Rocha Bedran	Aceito
Outros	compromisso_do_pesquisador_sem_assinatura.docx	14/09/2021 14:39:10	Natália Rocha Bedran	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	tcle.docx	14/09/2021 14:35:34	Natália Rocha Bedran	Aceito
Outros	Pesquisadores_Participantes_do_estudo_e_respectivos_links_para_Curriculo_Lattes.docx	14/09/2021 14:35:17	Natália Rocha Bedran	Aceito
Outros	folhaDeRosto.pdf	14/09/2021 14:30:38	Natália Rocha Bedran	Aceito
Orçamento	Orcamento.docx	13/09/2021 15:57:39	Natália Rocha Bedran	Aceito
Declaração de Pesquisadores	carta_de_apresentacao_sem_assinatura.docx	10/09/2021 15:35:00	Natália Rocha Bedran	Aceito
Declaração de Instituição e Infraestrutura	Declaracao_de_responsabilidade_da_instituicao.doc	10/09/2021 15:32:38	Natália Rocha Bedran	Aceito
Outros	Anexo_Lista_de_documentos_postados.docx	01/09/2021 15:33:02	Natália Rocha Bedran	Aceito
Outros	Apendice_1.docx	31/08/2021	Natália Rocha	Aceito

Outros	Apendice_1.docx	08:46:44	Bedran	Aceito

Situação do Parecer:
Aprovado

Necessita Apreciação da CONEP:
Não

RIO DE JANEIRO, 17 de Janeiro de 2022

Assinado por:
Carlos Alberto Guimarães
(Coordenador(a))

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PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Mudanças nos protocolos de terapia pulpar na prática da Odontopediatria devido a pandemia de COVID-19.

Pesquisador: Natália Rocha Bedran

Área Temática:

Versão: 3

CAAE: 52813321.3.0000.5245

Instituição Proponente: FUNDACAO OCTACILIO GUALBERTO

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 5.149.318

Apresentação do Projeto:

O SARS-CoV-2 é o coronavírus altamente infeccioso que causa o COVID-19 (WHO, 2021), sendo transmitido principalmente por meio de gotículas respiratórias em suspensão no ar e em aerossol e por contato direto ou indireto. Devido às chances de encontrar pacientes com suspeita ou confirmação da doença, cirurgiões-dentistas tiveram que desenvolver estratégias preventivas para evitar a COVID-19,como uso de técnicas de mínima intervenção que minimizem ou eliminem a geração de aerossóis, além de medidas preventivas abrangentes de saúde bucal. Levando em consideração a necessidade de um tempo de seguimento de no mínimo 30 minutos entre um paciente e outro após procedimentos de alta geração de aerossol, sugere-se como alternativa interessante o Tratamento Endodôntico Não Instrumental. Dessa forma, o objetivo do presente trabalho é investigar, através de um questionário eletrônico, se ocorreram mudanças nos protolocos de terapia pulpar em dentes decíduos durante a pandemia a fim de otimizar os atendimentos. O estudo será do tipo transversal observacional e após aprovação do comitê de ética, será feita uma busca ativa no Google e nas redes sociais pelos odontopediatras em todos os estados brasileiros em ambos setores público e privado. Serão considerados elegíveis odontopediatras de todas as cidades brasileiras Estimou a amostra com base no total de odontopediatras atuantes no Brasil, de acordo com osdados disponíveis no site do CFO, com 99% de confiança e 5% de erro amostral, um mínimo de 407 odontopediatras. Será elaborado um

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questionário eletrônico autoaplicável, composto por perguntas divididas em 3 domínios: 1) Informações profissionais – com a finalidade de detectar o perfil do profissional; 2) Gerenciamento de biossegurança – para avaliar as formas de biossegurança adotadas durante atendimento e 3) Protocolo endodôntico de atendimento antes, durante e após a pandemia – avaliar se houve alteração na prática clínica endodôntica em odontopediatria. Os dados coletados serão tabulados em um banco de dados elaborado no SPSS 20.0 (Statistical Package for Social Science for Windows, versão 13.0, SPSS Inc., Chicago, IL EUA) e submetidos a análises descritiva e comparativa por meio de testes estatísticos pertinentes.

Objetivo da Pesquisa:

Objetivo Primário:

Investigar, através de um questionário eletrônico, se ocorreram mudanças nos protocolos de terapia pulpar em dentes decíduos durante a pandemia.

Objetivo Secundário:

- Comparar as características dos protocolos utilizados durante a pandemia com protocolos estabelecidos previamente na literatura odontopediátrica.
- Investigar os motivos para possíveis mudança de protocolo.

Avaliação dos Riscos e Benefícios:

Considerando-se que não se justifica submeter seres humanos a riscos inutilmente e que toda pesquisa envolvendo seres humanos envolve algum tipo e grau de risco (Res. CNS n.° 466/12), o presente estudo tem como prioridade se adequar, do ponto de vista metodológico, para que se torne útil e eticamente aceitável, minimizando os riscos aos sujeitos de pesquisa. Assim, os riscos envolvidos nesta pesquisa são característicos do ambiente virtual, relacionados a potencial violação da confidencialidade de dados do respondente, em função das limitações próprias das tecnologias utilizadas. Neste sentido, os pesquisadores comprometem-se a minimizar estes riscos através da utilização do software de questionário (Google Forms®) empenhado a cumprir com as leis e regulamentos vigentes, de acordo com o Regulamento geral de proteção de dados (GDPR) e a Lei de Privacidade do Consumidor da Califórnia (CCPA). Além disso, apenas a pesquisadora responsável terá acesso as respostas através de seu login e senha no site, sendo a senha modificada frequentemente. Os dados pessoais dos participantes que poderiam ser identificados, como e-mail, não serão divulgados, garantindo o anonimato dos participantes. Ademais, as

respostas não serão utilizadas como forma de avaliação de conhecimento. Uma vez concluída a coleta de dados, será feito o download dos dados coletados para um dispositivo eletrônico local, apagando todo e qualquer registro de qualquer plataforma virtual, ambiente compartilhado ou "nuvem".

Comentários e Considerações sobre a Pesquisa:

Projeto de caráter acadêmico destinado a confecção de artigo científico atrelado a tese de doutorado, previsto para iniciar em dezembro/2021 e encerrar em fevereiro/2022. Trata-se de projeto de pesquisa transversal observacional. Será realizado no Brasil, através de financiamento próprio, com 407 participantes. Os dados obtidos serão armazenados em banco de dados próprio do pesquisador. Trata-se de estudo de relevância dentro da área de odontopediatria, pois visa disseminação de conhecimento científico em seu produto final. Em virtude da pandemia, houve necessidade de ajuste em relação a diferentes protocolos de atendimento, o que justifica a realização de estudo exploratório a fim de avaliar o atual panorama do procedimento de terapia pulpar dentro da especialidade

Considerações sobre os Termos de apresentação obrigatória:

Termos apresentados de acordo com as normas, a saber: folha de rosto declaração de pesquisadores e termo de anuência institucional.

Vide campo "conclusões ou pendências e lista de inadequações".

Recomendações:

Não há

Conclusões ou Pendências e Lista de Inadequações:

Trata-se da reposta à pendência indicadas no parecer consubstanciado n. 5.148.572, com data de 06/12/2021.

PENDÊNCIA ATUAL: Há necessidade de retirada do timbre do CEP do TCLE.

RESPOSTA: a mesma foi apresentada em CARTA RESPOSTA; O timbre do CEP foi retirado de todos os documentos, inclusive do TCLE e resubmetidos à Plataforma Brasil

ANÁLISE: ATENDIDA

Considerações Finais a critério do CEP:

Respondidas a s pendências da Versão anterior, atendendo-se aos ajustes propostos, tem-se como APROVADO este projeto

Os autores têm o compromisso ético em manterem atualizados os dados da execução desse

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projeto (Relatórios parciais da Pesquisa), na Plataforma Brasil; inclusive quanto ao término do mesmo – em conformidade com o cronograma apresentado e aprovado, neste Parecer.

Cabe destacar que a equipe de pesquisa deverá, uma vez concluída a mesma, anexar na Plataforma Brasil, o "RELATÓRIO FINAL DE PESQUISA". Ressalta-se que a previsão, conforme ao Cronograma aprovado, para o término da pesquisa é para FEVEREIRO DE 2022..

Na ocasião, inseridas a devidas informações na Plataforma Brasil, a equipe deverá, também, encaminhar a este CEP, por e-mail, que tais inserções foram feitas.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1847230.pdf	06/12/2021 17:31:54		Aceito
Outros	Carta_resposta.docx	06/12/2021 17:30:48	Natália Rocha Bedran	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE.pdf	06/12/2021 17:25:14	Natália Rocha Bedran	Aceito
Declaração de Instituição e Infraestrutura	Declaracao_de_responsabilidade_da_instit.pdf	09/11/2021 09:06:53	Natália Rocha Bedran	Aceito
Declaração de Pesquisadores	compromisso_do_pesquisador_com_assinatur.pdf	09/11/2021 04:28:18	Natália Rocha Bedran	Aceito
Outros	carta_de_apresentacao_com_assinatura.pdf	09/11/2021 04:26:39	Natália Rocha Bedran	Aceito
Outros	carta_de_apresentacao_sem_assinatura.docx	09/11/2021 04:17:43	Natália Rocha Bedran	Aceito
Declaração de Pesquisadores	compromisso_do_pesquisador_sem_assinatura.docx	09/11/2021 04:17:06	Natália Rocha Bedran	Aceito
Outros	Pesquisadores_Participantes_do_estudo_e_respectivos_links_para_Curriculo_Lattes.pdf	09/11/2021 04:16:45	Natália Rocha Bedran	Aceito
Orçamento	Orcamento.docx	09/11/2021 04:15:47	Natália Rocha Bedran	Aceito
Cronograma	cronograma.docx	09/11/2021 04:15:01	Natália Rocha Bedran	Aceito
Folha de Rosto	Folha_de_rosto_assinada.pdf	23/10/2021 16:59:11	Natália Rocha Bedran	Aceito

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Projeto Detalhado / Brochura Investigador	Protocolo_CEP.docx	22/10/2021 08:49:29	Natália Rocha Bedran	Aceito
Outros	Questionario.docx	22/10/2021 08:49:06	Natália Rocha Bedran	Aceito
Outros	folhaDeRosto.pdf	22/10/2021 08:47:11	Natália Rocha Bedran	Aceito

Situação do Parecer:
Aprovado

Necessita Apreciação da CONEP:
Não

PETROPOLIS, 06 de Dezembro de 2021

Assinado por:
ATTILIO VALENTINI
(Coordenador(a))

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Anexo B – Permissão de uso do artigo

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Does Calcium Hydroxide Reduce Endotoxins in Infected Root Canals? Systematic Review and Meta-analysis

Author:
Natália Rocha Bedran,Patricia Nadelman,Marcela Baraúna Magno,Aline de Almeida Neves,Daniele Masterson Ferreira,Andréa Vaz Braga Pintor,Lucianne Cople Maia,Laura Guimarães Primo

Publication: Journal of Endodontics

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9. Apêndices

Apêndice 1 – Termo de consentimento livre e esclarecido destinados aos participantes do estudo três

FACULDADE DE ODONTOLOGIA
Programa de Pós-graduação em Odontologia

UFRJ
UNIVERSIDADE FEDERAL DO RIO DE JANEIRO

Termo de Consentimento Livre e Esclarecido

(ACEITO VIRTUALMENTE)

Título do projeto de pesquisa: "**Influência da pandemia de COVID-19 nos protocolos de terapia pulpar na prática da Odontopediatria"**

Pesquisadora responsável: Natália Rocha Bedran, do Departamento de Odontopediatria e Ortodontia da Universidade Federal do Rio de Janeiro (UFRJ), orientada pela professora doutora Laura Salignac de Souza Guimarães Primo.

Você está sendo convidado a participar dessa pesquisa de forma voluntária, respondendo um questionário, com 35 perguntas, que levará aproximadamente dez minutos.

Objetivo da pesquisa: Investigar, através de um questionário eletrônico, se ocorreram mudanças nos protolocos de terapia pulpar em dentes decíduos durante a pandemia.

Procedimento: A pesquisa se baseia na coleta dos dados obtidos através desse questionário, que objetiva caracterizar as possíveis mudanças de atendimento durante as urgências endodônticas em odontopediatria. É importante salientar que não existem respostas certas ou erradas. Esta pesquisa não avaliará nenhum conhecimento sobre o assunto e os resultados não serão divulgados junto a seus

dados pessoais. O convite será sempre realizado de forma individual, não tendo os demais participantes acesso a seu endereço de e-mail ou número de telefone. Em todas as formas de convite, os participantes receberão o link com o endereço eletrônico com o TCLE e, somente após sua anuência, terão acesso ao questionário.

Riscos: característicos do ambiente virtual, relacionados a potencial violação da confidencialidade de dados do respondente, em função das limitações próprias das tecnologias utilizadas. Neste sentido, os pesquisadores comprometem-se a minimizar estes riscos através da utilização de software de questionário (Google Forms®) empenhado a cumprir com as leis e regulamentos vigentes, de acordo com o Regulamento geral de proteção de dados (GDPR) e a Lei de Privacidade do Consumidor da Califórnia (CCPA). Além disso, apenas a pesquisadora responsável terá acesso as respostas através de seu login e senha no site, sendo a senha modificada frequentemente.

Benefícios: a contribuição ao estudo da terapia pulpar em dentes decíduos, ampliação e disseminação do conhecimento acerca desta temática. Colaborando, portanto, para o aprimoramento do desempenho de pulpectomias em dentes decíduos e na obtenção de maiores frequências de sucesso.

Garantia de esclarecimento e liberdade de recusa: Você será esclarecido(a) sobre a pesquisa em qualquer aspecto que desejar. Somente após a anuência Todos os dados coletados nessa pesquisa ficarão armazenados pelo período mínimo de cinco anos em um dispositivo eletrônico local. Você é livre para recusar-se a participar, retirar seu consentimento ou interromper a participação a qualquer momento durante a pesquisa ou durante aquele período (5 anos). Você terá direito

do acesso ao teor do conteúdo da pesquisa antes de responder as perguntas, para que haja uma tomada de decisão informada. A sua participação é voluntária e você tem o direito de não responder qualquer questão, sem necessidade de explicação ou justificativa para tal, podendo também se retirar da pesquisa a qualquer momento sem sofrer nenhum tipo de penalização ou prejuízo. A pesquisadora responsável enviará ao participante de pesquisa, resposta de ciência da retirada do consentimento.

Garantia de sigilo: Os pesquisadores irão tratar a sua identidade com padrões profissionais de sigilo. Além disso, as informações obtidas serão apenas manipuladas por membros da equipe, mantendo-se em caráter confidencial dados que comprometam a privacidade dos participantes. As suas respostas serão enviadas para você e permanecerão confidenciais. Ao finalizar o questionário, você receberá uma mensagem no e-mail cadastrado por você, na questão 1, para acessar todas as suas respostas. Esse termo, aceito virtualmente pelo participante, assinado pela pesquisadora responsável, será também enviado a você e aconselhamos que guarde uma cópia desse documento em seus arquivos. Os resultados da pesquisa somente serão divulgados com o objetivo científico, em literatura científica especializada, estando também disponíveis para consulta na Biblioteca da FO/UFRJ. Você não será identificado(a) em nenhuma publicação que possa resultar desse estudo. Ao final da coleta de dados, a pesquisadora responsável irá baixar todos dados coletados para um dispositivo eletrônico local, apagando todo e qualquer registro de qualquer plataforma virtual (“nuvem”).

Despesas e compensações: A participação nesta pesquisa não gera custos aos participantes, não tendo, em momento algum, despesas financeiras pessoais. As

despesas, assim, se por ventura ocorrerem, serão de responsabilidade dos pesquisadores. Também, não haverá compensação financeira relacionada à participação nesta pesquisa.

Garantia de indenização: Em caso de eventuais danos pessoais, causados por danos comprovadamente ligados a participação neste estudo, o participante terá direito às indenizações legalmente estabelecidas.

Garantia de acesso aos pesquisadores: informações sobre a pesquisa poderão ser obtidas a qualquer momento através da pesquisadora Natália Rocha Bedran pelo telefone (21) 3938-2101 r.5 ou pelo e-mail nataliabedran@hotmail.com.

Quaisquer outras informações adicionais que julgar importantes para compreensão do desenvolvimento da pesquisa poderão ser obtidas no Comitê de Ética em Pesquisa com Seres Humanos do Hospital Universitário Clementino Fraga Filho (HUCFF/UFRJ), subordinado ao Conselho Nacional de Ética em Pesquisa, órgão do Ministério da Saúde, através de solicitação ao representante de pesquisa, que estará sob contato permanente, OU contatando o Comitê de Ética em Pesquisa do Hospital Universitário Clementino Fraga Filho/HUCFF/UFRJ – R. Prof. Rodolpho Paulo Rocco, n.°255 – Cidade Universitária/Ilha do Fundão - 7° andar – ALA E, pelo telefone 3938-2480, de segunda a sexta-feira, das 8 às 16 horas, ou através do e-mail: cep@hucff.ufrj.br. O Comitê de Ética em Pesquisa é um órgão que controla as questões éticas das pesquisas na instituição e tem como uma das principais funções proteger os participantes da pesquisa de qualquer problema.

Esse documento será aceito virtualmente, através da marcação do item abaixo “Li e concordo em participar do estudo”. Em caso de dúvidas ou questionamentos,

pode se manifestar agora ou em qualquer momento do estudo para explicações adicionais

1- Aceita participar da pesquisa?

☐ Li e concordo em participar do estudo.

☐ Li e não concordo em participar do estudo.

Sua participação é muito importante para nós!!

Apêndice 2 – Questionário eletrônico elaborado para o estudo três

Bloco 1: Informações profissionais – com a finalidade de detectar o perfil do profissional

1) Seu e-mail:
2) Sexo: (1) masculino (2) feminino (3) prefiro não declarar
3) Idade: ____ anos
4) Ano de conclusão da graduação: _____
5) Você é especialista em Odontopediatria? ( ) Sim ( ) Não ( ) Mestre/Doutor
6) Ano de conclusão da especialização em Odontopediatria: _____
7) Universidade de formação na especialização: ( ) pública ( ) privada
8) Você atua como odontopediatra em qual estado?

   ( ) Acre ( ) Alagoas ( ) Amapá ( ) Amazonas ( ) Bahia ( ) Ceará

   ( ) Distrito Federal ( ) Espírito Santo ( ) Goiás ( ) Maranhão ( ) Mato Grosso

   ( ) Mato Grosso do Sul ( ) Minas Gerais ( ) Pará ( ) Paraíba ( ) Paraná

   ( ) Pernambuco ( ) Piauí ( ) Rio de Janeiro ( ) Rio Grande do Norte ( ) Rio Grande do Sul ( ) Rondônia ( ) Roraima ( ) Santa Catarina ( ) São Paulo ( ) Sergipe ( ) Tocantins

9) Em que (quais) cidade(s) você trabalha?
10) Em qual(is) setor(es) você atua: ( ) clínica pública ( ) clínica privada ( ) docência em universidade pública ( ) docência em universidade particular ( ) aluno de pós-graduação

Bloco 2: Gerenciamento de biossegurança – para avaliar as formas de biossegurança adotadas durante atendimento

11) Existe algum protocolo de biossegurança onde você atua?

( ) sim ( ) não ( ) prefiro não responder

12) Quanto a COVID-19, quais as técnicas de triagem de pacientes são utilizadas no seu cotidiano? Por favor, marque todas as opções que se apliquem:

( ) Questionário prévio (ligação via telefone, mensagem de texto ou via WhatsApp)

( ) Questionário presencial (escrito na sala de espera ou oral) ( ) Aferição da temperatura corporal do paciente ( ) RT-PCR

( ) Outro. Qual? _____

13) Durante a triagem, qual(is) da(s) alternativa(s) a seguir você identifica como sintomas sugestivos de COVID-19?

( ) Temperatura corporal superior a 38º C ( ) Tosse ( ) Dor de garganta

( ) Falta de ar ( ) Sintomas como os da gripe ( ) Dor muscular

( ) Olhos vermelhos ou doloridos ou coceira nos olhos ( )Vômito, diarreia, dor de estômago ( ) Perda de olfato ( ) Perda de Paladar ( ) Coriza ( ) dor nas articulações ( ) dor de cabeça ( ) dor no corpo ( ) fraqueza ( ) perda de apetite

14) Caso paciente apresente dois ou mais sintomas sugestivo de COVID-19, qual sua conduta? Por favor, marque todas as opções que se aplicam:

( ) reagendamento da consulta ( ) atender mesmo assim ( ) solicitar teste ( ) outro (especifique)

15) Qual das alternativas a seguir melhor descreve as medidas que você adotou atualmente, além do EPI que era utilizado antes da pandemia? Por favor, marque todas as opções que se aplicam:

( ) Máscara facial N95/PFF2 ( ) Óculos de proteção ( ) Protetor facial/*face shield* ( ) Traje de proteção (capote, jaleco descartável e outros) ( ) Pijama cirúrgico ( ) Luva ( ) Protetor de cabeça (touca) ( ) Protetor de sapato ( ) Unidade de purificação de ar ( ) janela aberta ( ) dispensa do ar-condicionado? ( ) atendimentos espaçados ( ) atendimentos com hora marcada ( ) redução de atendimentos

( ) Outro. Especifique:

( ) Não mudei minha rotina

16) Você realiza algum protocolo de antissepsia no paciente prévio ao atendimento?

( ) não

( ) sim. Especifique:

17) A equipe realiza algum protocolo de limpeza da sala clínica entre um paciente e outro?

( ) não

( ) sim. Especifique:

18) Você realizava esse protocolo de limpeza da sala clínica entre um paciente e outro antes da pandemia?

( ) sim ( ) não

19) Pretende manter esse protocolo de limpeza após o término da pandemia?

( ) sim ( ) não

20) Você reduziu o número de atendimentos do dia?

( ) sim ( ) não

21) Sua sala de espera antes da pandemia possuía artigos de decoração voltados para o público infantil, como brinquedos, livros, bonecas, entre outros?

( ) sim ( ) não

22) Após o início do quadro de Pandemia, manteve a sala de espera como antes da Pandemia?

( ) sim, mantive. ( ) não, retirei todos os objetos. ( ) Não, reduzi a quantidade de objetos.

( ) Não, deixei apenas aqueles que são fáceis de higienizar.

23) Você entregava brindes aos pacientes antes da pandemia?

( ) sim ( ) não

24) Após a pandemia, continuou oferecendo brindes para os pacientes?

( ) sim ( ) não ( ) No início não, mas voltei há pouco tempo.

25) Se você atualmente oferece brindes, como está essa entrega?

( ) não se aplica ( ) eu escolho e entrego ( ) a secretária entrega ( ) seleciono alguns e deixo a criança escolher ( ) a criança pode mexer na gaveta e escolher o que quiser após higienização das mãos ( ) Outro. Especifique:

Bloco 3 : Protocolo endodôntico de atendimento antes, durante e após a pandemia – avaliar se houve alteração na prática clínica endodôntica em odontopediatria

26) Comparando o número de pacientes que você atende diariamente hoje e antes da pandemia da COVID-19, seu fluxo de pacientes:

( ) Aumentou ( ) Diminuiu ( ) Não percebi diferença

27) A pandemia da COVID-19 alterou as necessidades/gravidade dos casos em sua prática quando comparada com a mesma época antes da pandemia?

( ) sim ( ) não

28) Se você respondeu “sim” na pergunta anterior, quais mudanças você notou:

( ) Aumentou o número de casos com necessidade de procedimentos mais invasivos ( ) Diminuiu o número de tratamentos preventivos ( ) Aumentou o número de urgências

( ) Não houve mudança

29) A pandemia da COVID-19 alterou o planejamento dos casos em sua prática quando comparada com a mesma época antes da pandemia?

( ) sim ( ) não

30) Se você respondeu “sim” na pergunta anterior, quais alterações no planejamento foram feitas?

( ) Não houve alteração ( ) As terapias pulpares programadas viraram exodontia ( ) As resinas programadas viraram tratamento restaurador atraumático (TRA) ( ) As

consultas de acompanhamento de casos e de instrução de dieta e higiene tornaram-se virtuais ( ) Outro. Especifique:

31)**Antes da pandemia**, você costumava pedir radiografias ou fazia em consultório?

( ) Realizava a radiografia no consultório ( ) Encaminhava para os centros radiológicos ( ) Não possuo aparelho de radiografia no consultório

32)**Durante a pandemia,** você tem optado por:

( ) Realizar a radiografia no consultório ( ) Encaminhar para os centros radiológicos ( ) Não possuo aparelho de radiografia no consultório

33) Houve mudança no seu protocolo de terapia pulpar:

( ) sim ( ) não

34) Caso você tenha respondido "sim" na pergunta anterior, especifique o(s) motivo(s):

( ) Não se aplica ( ) Financeiro ( ) falta de disponibilidade de material ( ) Opção por procedimentos com menos tempo de cadeira ( ) seguir uma tendência minimamente invasiva

35)**Antes da pandemia**, você costumava optar por qual técnica para tratamento de dentes decíduos com inflamação irreversível ou necrose pulpar?

( ) Instrumentação dos canais radiculares (tratamento endodôntico convencional ou pulpectomia) ( ) Sem instrumentação dos canais radiculares ( ) exodontia ( ) não faço endodontia em dentes decíduos

36)**Durante a pandemia**, qual técnica você tem preferido para esses casos?

( ) Instrumentação dos canais radiculares ( ) Sem instrumentação dos canais radiculares ( ) exodontia ( ) não faço endodontia em dentes decíduos

37)Caso tenha optado pela técnica não instrumental, qual o material que utilizou?

( ) Não se aplica ( ) Pasta triantibiótica ( ) pasta CTZ ( ) Outra. Especifique:

38)Com que frequência você utiliza o dique de borracha durante a terapia pulpar:

Antes da pandemia:

( ) Sempre ( ) Frequentemente ( ) As vezes ( ) Raramente ( ) Nunca

Durante da pandemia:

( ) Sempre ( ) Frequentemente ( ) As vezes ( ) Raramente ( ) Nunca

Pretende manter após a pandemia:

( ) Sempre ( ) Frequentemente ( ) As vezes ( ) Raramente ( ) Nunca

39)**Antes da pandemia,** em quantas sessões você normalmente realizava a terapia pulpar em dentes anteriores?

( ) Sessão única ( ) Múltiplas sessões Qual medicação intracanal usa?

40)**Antes da pandemia,** em quantas sessões você normalmente realizava a terapia pulpar em dentes posteriores?

( ) Sessão única ( ) Múltiplas sessões. Qual medicação intracanal usa? (especifique)

41)**Durante a pandemia,** em quantas sessões você normalmente realiza terapia pulpar em dentes anteriores?

( ) Sessão única ( ) Múltiplas sessões. Qual medicação intracanal usa? (especifique)

42)**Durante a pandemia,** em quantas sessões você normalmente realiza terapia pulpar em dentes posteriores? (especifique)

( ) Sessão única ( ) Múltiplas sessões. Qual medicação intracanal usa?

43)Que material utiliza para a restauração final ?

Antes da pandemia:

( ) Cimento de ionômero de vidro (CIV) ( ) Resina composta ( ) CIV + Coroa de aço inoxidável ( ) CIV + Coroa de zircônia ( ) Coroa de celulóide ( ) CIV + resina ( ) Outros (especifique)

Durante a pandemia:

( ) Cimento de ionômero de vidro (CIV) ( ) Resina composta ( ) CIV + Coroa de aço inoxidável ( ) CIV + Coroa de zircônia ( ) Coroa de celuloide ( ) CIV + resina ( ) Outros (especifique)

Agradecemos sua participação!