UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL

FACULDADE DE ODONTOLOGIA

DEPARTAMENTO DE ODONTOLOGIA CONSERVADORA

CHARLES ANDRÉ DALL AGNOL JÚNIOR

# INFLUÊNCIA DO MANEJO FARMACOLÓGICO DA ANSIEDADE NA OCORRÊNCIA DE DOR DURANTE O TRATAMENTO ENDODÔNTICO: UMA REVISÃO SISTEMÁTICA

Porto Alegre

2021

CHARLES ANDRÉ DALL AGNOL JÚNIOR

# INFLUÊNCIA DO MANEJO FARMACOLÓGICO DA ANSIEDADE NA OCORRÊNCIA DE DOR DURANTE O TRATAMENTO ENDODÔNTICO: UMA REVISÃO SISTEMÁTICA

Trabalho de Conclusão de Curso apresentado ao Curso de Graduação em Odontologia da Faculdade de Odontologia da Universidade Federal do Rio Grande do Sul, como requisito parcial para obtenção do título de Cirurgião-Dentista.

Orientador: Ricardo Abreu da Rosa

Porto Alegre

2021

CHARLES ANDRÉ DALL AGNOL JÚNIOR

# INFLUÊNCIA DO MANEJO FARMACOLÓGICO DA ANSIEDADE NA OCORRÊNCIA DE DOR DURANTE O TRATAMENTO ENDODÔNTICO: UMA REVISÃO SISTEMÁTICA

Trabalho de Conclusão de Curso apresentado ao Curso de Graduação em Odontologia da Faculdade de Odontologia da Universidade Federal do Rio Grande do Sul, como requisito parcial para obtenção do título de Cirurgião-Dentista.

Orientador: Ricardo Abreu da Rosa

Porto Alegre, 20 de Maio de 2021.

---

Ricardo Abreu da Rosa

Universidade Federal do Rio Grande do Sul

---

Marcus Vinícus Reis Só

Universidade Federal do Rio Grande do Sul

---

Tiago André Fontoura de Melo

Universidade Federal do Rio Grande do Sul

## AGRADECIMENTOS

Agradeço, primeiramente, à minha **família**. Sempre deram todas as condições para eu conseguir alcançar os meus objetivos. Por todo o suporte. Tudo o que sou hoje é graças a eles. Serei grato eternamente por isso.

Agradeço à minha namorada, **Camila Klohs**, por sempre me apoiar e estar ao meu lado.

Agradeço ao meu orientador, que posso chamar de amigo. Por ter acreditado no meu potencial; por ter me apoiado em diversas possibilidades dentro da universidade; por ter escutado todas as angústias em meio à pandemia; por toda a parceria; por ser esse professor diferenciado, que tu sabes que és; não é por acaso que és tão especial em meio aos alunos; agradeço do fundo do meu coração, Prof. **Dr. Ricardo Abreu da Rosa.**

Agradeço imensamente aos alunos de pós-graduação **Theodoro Weissheimer** e **Isadora Ames Silva**, pela parceria e contribuição nessa pesquisa. Vocês foram essenciais. À **Natália Abrahão**, por toda a parceria na iniciação científica.

Agradeço a todos os amigos que fiz na faculdade. Vocês fizeram esse caminho mais fácil. Não vejo a hora de abraçá-los. Em especial aos amigos **Vinícius Eilers, Eduardo Antunes, Bernardo Cezimbra, Maximiliano Reidel, Paulo Justo, Raphael Fernandes, Lorenzo Morando, Nadini Lunkes, Leonardo Zanotto, Pedro Melecchi e Nathan Oliveira.**

Agradeço a todos os professores da universidade, que fizeram parte da minha evolução ao longo do curso. Em especial a **Prof. Dr. Marcus Vinícius Reis Só, Prof.**

**Dr. Tiago André Fontoura de Melo, Prof. Dr. Lucas Silveira, Prof. Dr. Roberto Pimentel, Prof. Dr. Eduardo Gaio, Profa. Drª. Simone Bonato Luisi.** Vocês são profissionais excelentes. Me espelho muito em cada um. Tenham a certeza de que deixaram diversos ensinamentos, tanto no quesito profissional quanto pessoal. Obrigado.

# Sumário

**RESUMO**

A conotação negativa dos procedimentos endodônticos pode aumentar a ansiedade do paciente e, consequentemente, a ocorrência de dor. O objetivo dessa revisão sistemática foi responder a pergunta: O manejo farmacológico da ansiedade influencia a ocorrência de dor durante o tratamento endodôntico? Bancos de dados eletrônicos (MEDLINE/PubMed, Cochrane Library, Web of Science, Scopus, EMBASE and Open Grey) foram pesquisados até fevereiro de 2021. Apenas ensaios clínicos randomizados (ECR) que avaliaram a influência de intervenções farmacológicas da ansiedade na ocorrência de dor durante o tratamento de canal radicular foram incluídos. Os resultados relevantes foram resumidos e avaliados. A ferramenta Cochrane de risco de viés para estudos randomizados (RoB 2) foi usada para avaliar o risco de viés dos estudos incluídos. A qualidade geral das evidências foi avaliada por meio da ferramenta Grading of Recommendations Assessment, Development and Evaluation (GRADE). A triagem inicial das bases de dados resultou em 510 estudos, dos quais 43 foram excluídos por serem duplicados. Dos 467 artigos elegíveis, dez estudos preencheram o critério de inclusão e foram selecionados para a leitura do texto completo. Seis estudos foram excluídos por não terem intervenções farmacológicas. Quatro estudos foram incluídos e um estudo adicional foi recuperado de suas referências. Um ECR foi classificado como risco incerto de viés, três como baixo risco de viés e um como alto risco de viés. A análise GRADE demonstrou uma evidência de baixa qualidade. Com pouca certeza das evidências, é possível inferir que os benzodiazepínicos não influenciam na ocorrência de dor durante os procedimentos endodônticos. No entanto, o gás de óxido nitroso parece influenciar positivamente o mesmo parâmetro.

**Palavras-chave**: Ansiedade, endodôntica, dor intraoperatória, revisão sistemática

**ABSTRACT**

The negative connotation of the endodontic procedures can increase the patient's anxiety and therefore the occurrence of pain. The objective of this systematic review was to answer the question: Does the pharmacological management of anxiety influence pain occurrence during root canal treatment? Electronic databases (MEDLINE/PubMed, Cochrane Library, Web of Science, Scopus, EMBASE, and Open Grey) were searched until February 2021. Only randomized clinical trials (RCTs) that evaluated the influence of pharmacological interventions of anxiety on pain occurrence during root canal treatment were included. Relevant findings were summarized and evaluated. Cochrane risk of bias tool for randomized trials (RoB 2) was used to assess the included studies' risk of bias. Overall quality of evidence was assessed through the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) tool. Initial screening of databases resulted in 510 studies, of which 43 were excluded for being duplicates. Of 467 eligible papers, ten studies met the inclusion criteria and were selected for full-text reading. Six studies were excluded for not having evaluated pharmacological interventions. Four studies were included, and one additional study was retrieved from their references. One RCT was classified as unclear risk of bias, three as low risk of bias, and one as high risk of bias. GRADE analysis demonstrated a low quality of evidence. With a low certainty of the evidence, it is possible to infer that benzodiazepines do not influence the pain occurrence during the endodontic procedures. However, nitrous oxide gas seems to influence the same parameter positively.

**Key words:** Anxiety, endodontic, intraoperative pain, systematic review

## 1. INTRODUÇÃO E REVISÃO DE LITERATURA

A ansiedade decorrente de procedimentos odontológicos, especialmente do tratamento endodôntico, já é bem relatada na literatura (ALROOMY, 2020; CHEN et al., 2020; DOU et al., 2018a; PERKOVIĆ et al., 2014a; YILDIRIM et al., 2017a). Uma vez que a sintomatologia dolorosa está relacionada a fatores cognitivos e emocionais, tais como experiências prévias, capacidade de compreensão por parte do paciente sobre os procedimentos que serão realizados e percepção sobre sons e movimentos, a ansiedade gerada pode resultar em maior ocorrência de dor durante o tratamento odontológico (ALROOMY, 2020; MAGGIRIAS; LOCKER, 2002a). Além disso, um paciente com alta ansiedade pode dificultar a definição do diagnóstico endodôntico, exigindo do cirurgião-dentista uma abordagem cautelosa na interpretação da sintomatologia relatada pelo paciente (ELI, 1993). Portanto, o atendimento de pacientes com esse comportamento é um grande desafio na prática clínica.

Somada a dificuldade de atendimento por parte do profissional, a ansiedade dentária pode impactar de diversas maneiras esses pacientes. Um estudo prévio teve como objetivo avaliar o impacto da ansiedade dentária na vida diária de pessoas ansiosas. A maioria dos participantes relatou ter sintomas fisiológicos de medo, como suor, boca seca e aumento da frequência cardíaca não só no dia da consulta, mas também na noite anterior. Após o tratamento, muitos dos pacientes expressaram um sentimento de exaustão. Os autores concluíram que o impacto da ansiedade é amplo e dinâmico, e pode afetar a alimentação, higiene oral, qualidade de sono, desempenho no trabalho e novos relacionamentos pessoais (COHEN et al., 2000).

Há alguns métodos para avaliar a ansiedade dos pacientes. A escala Corah Dental Anxiety Scale (DAS) foi proposta em 1969. Essa escala contém quatro perguntas de múltipla escolha, abordando algumas reações subjetivas dos pacientes sobre seus sentimentos no momento da ida ao dentista, na sala de espera e na cadeira odontológica. Em aproximadamente três minutos, o paciente consegue responder ao questionário e atribui uma pontuação. Quanto mais alta for a pontuação, maior o grau de ansiedade atribuído (NL; EN; SJ, 1978).

Os testes para avaliar dor normalmente é realizado com o uso da Escala Visual Analógica (VAS, Visual Analogue Scale). Essa escala permite avaliar diversos

sentimentos subjetivos. Consiste em uma linha (normalmente de dez centímetros), onde há extremidades com palavras descritivas de um sentimento mínimo e máximo, onde o paciente fará uma marcação vertical sobre a linha horizontal onde mais se enquadra no momento (MCCORMACK; DE L. HORNE; SHEATHER, 1988). No estudo de Lindemann *et al*., (2008), por exemplo, essa escala foi dividida em quatro categorias: nenhuma dor (0mm); dor leve (0 a 54mm); dor moderada (54 a 114mm); e dor severa (igual ou maior que 114mm).

Como alternativa, a sedação consciente se apresenta como uma opção de tratamento com o objetivo de controlar o nervosismo e o medo apresentado pelo paciente e, por consequência, a sua experiência de dor (GOULART et al., 2012a; OLIVEIRA; ALEIXO; RODRIGUES, 2010; WEISSHEIMER et al., 2016a). De acordo com a Sociedade Americana de Anestesiologia, a sedação consciente é definida como a redução da consciência, induzida por fármacos, em que o paciente ainda demonstra capacidade de responder a comandos verbais e/ou leves estímulos táteis (AMERICAN SOCIETY OF ANESTHESIOLOGISTS, 2019).

Um dos métodos para a obtenção de sedação consciente é por meio da utilização de fármacos por via oral, chamados de benzodiazepínicos. Esses fármacos, são amplamente prescritos devido a sua eficácia e segurança de uso e pela facilidade de administração por parte do paciente (COGO et al., 2006). Além disso, os benzodiazepínicos apresentam baixa toxicidade e baixa capacidade de causar dependência (TEIXEIRA; ADOLFO; QUESADA, 2004). Entretanto, a incapacidade de manejo da dose de acordo com a resposta do paciente e seu efeito relativamente imprevisível são algumas limitações desses medicamentos (EHRICH et al., 1997a).

Nessa classe de fármacos utilizados para o controle da ansiedade está o alprazolam. Esse medicamento atinge a concentração plasmática máxima entre 1 e 2 horas. Entretanto, a sua metabolização e excreção são relativamente lentas, levando em média de 12 a 15 horas para ser eliminado. Outra opção é o midazolam, fármaco que atinge seu pico máximo de efeito em apenas 30 minutos. Sua meia-vida é de 2 a 5 horas, sendo muito útil nos procedimentos de curta duração. Já o diazepam possui alta lipossolubilidade, exercendo seu efeito rapidamente. Porém, é lentamente eliminado do organismo. Em um estudo que avaliou o controle da ansiedade em pacientes endodônticos, foi utilizado triazolam, diazepam ou placebo. O grupo

triazolam foi mais eficaz na redução da ansiedade dos pacientes pré-tratamento endodôntico, em relação aos outros grupos (EHRICH et al., 1997a).

Uma alternativa para a utilização em ambiente odontológico é o gás de óxido nitroso. Seu uso clínico se mostra extremamente seguro e, além de possuir propriedades sedativas e hipnóticas, também promove leve efeito analgésico (BECKER; ROSENBERG, 2008a; FOLAYAN; FAPONLE; LAMIKANRA, 2002a). A sedação com óxido nitroso proporciona início rápido de ação e sua dosagem é obtida de forma incremental (COGO et al., 2006). Suas limitações incluem o alto custo do material e dos equipamentos necessários, assim como a necessidade de habilitação do profissional para a realização do procedimento (COGO et al., 2006; FOLAYAN; FAPONLE; LAMIKANRA, 2002a). A sedação ideal com o óxido nitroso é alcançada quando o paciente relata algumas ou todas as seguintes sensações: leve tontura, sensação de calor pelo corpo, dormência nas mãos e/ou pés, sensação de euforia e leveza ou peso das extremidades (MALAMED, 2017).

A relação da ansiedade com a percepção de dor em tratamentos endodônticos vem sendo estudada por diversos autores (DOU et al., 2018a; MURILLO-BENÍTEZ et al., 2020). O tratamento endodôntico é um dos procedimentos odontológicos onde a relação dor e ansiedade é comumente encontrada (MAGGIRIAS; LOCKER, 2002a; PRATHIMA et al., 2014a). A necessidade de realizar esse tratamento muitas vezes se torna algo temido previamente pela conotação negativa que possui na consciência social, bem como pela antecipação de uma experiência negativa, podendo aumentar a ansiedade do paciente (GRUPE; NITSCHKE, 2013a; KHAN et al., 2016a).

Entre as razões de fracasso da anestesia pulpar está o estado psicológico do paciente. É relatado que pacientes ansiosos possuem cerca de duas vezes mais chances de manifestar dor intraoperatória (LIN et al., 2013a; MURILLO-BENÍTEZ et al., 2020). O entendimento da ansiedade associada ao tratamento endodôntico é importante, uma vez que existe uma relação com a ocorrência de dor intraoperatória, e o seu controle pode melhorar o manejo do paciente e aumentar a aceitação e conclusão do tratamento (KHAN et al., 2016a). O limiar de excitabilidade representa o nível em que, acima dele, um estímulo causará dor. A ansiedade diminui esse limiar, e pode tornar o anestésico local menos eficaz (LOPES; SIQUEIRA, 2020).

Visto que o controle da ansiedade pode trazer benefícios durante o tratamento endodôntico, se faz necessária a verificação das informações disponíveis quanto a

efetividade da utilização de técnicas de controle farmacológico da ansiedade, por meio da indução da sedação consciente, e a ocorrência de dor intraoperatória. Até o momento, nenhuma revisão sistemática foi realizada avaliando tais informações. Portanto, o objetivo desta revisão sistemática é o de responder a seguinte pergunta: “O manejo farmacológico da ansiedade influencia na ocorrência de dor durante o tratamento endodôntico?”.

## 2. OBJETIVOS

### 2.1 OBJETIVO GERAL

Avaliar as evidências científicas disponíveis referentes a ansiedade e sua influência na dor intraoperatória durante o tratamento endodôntico.

### 2.2 OBJETIVOS ESPECÍFICOS

Verificar as evidências científicas que tenham analisado a ansiedade e sua influência na dor intraoperatória durante o tratamento endodôntico quanto ao risco de viés e qualidade de evidência dos estudos disponíveis.

## 3. ARTIGO CIENTÍFICO

3.1 Artigo científico submetido ao periódico Journal of Endodontics (Fator de Impacto = 3.118)

# Influence of the pharmacological management of anxiety on pain occurrence during root canal treatment: a systematic review

Isadora Ames Silva, DDs[*], Charles André Dall Agnol Júnior[*], Theodoro Weissheimer, MSc[*], Marcus Vinicius Reis Só, PhD*, Ricardo Abreu da Rosa, PhD[*]

[(*)] Department of Conservative Dentistry, School of Dentistry, Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, RS, Brazil

**Acknowledgments**

The authors deny any conflicts of interest

**Corresponding author**

Theodoro Weissheimer

Department of Conservative Dentistry, Federal University of Rio Grande do Sul - Rua Ramiro Barcelos, 2492, Porto Alegre, RS, Brazil

E-mail: theodoro.theo@hotmail.com

Phone: (+55) 51 996924725

## ABSTRACT

**Introduction:** The negative connotation of the endodontic procedures can increase the patient's anxiety and therefore the occurrence of pain. The objective of this systematic review was to answer the question: Does the pharmacological management of anxiety influence pain occurrence during root canal treatment? **Methods**: Electronic databases (MEDLINE/PubMed, Cochrane Library, Web of Science, Scopus, EMBASE, and Open Grey) were searched until February 2021. Only randomized clinical trials (RCTs) that evaluated the influence of pharmacological interventions of anxiety on pain occurrence during root canal treatment were included. Relevant findings were summarized and evaluated. Cochrane risk of bias tool for randomized trials (RoB 2) was used to assess the included studies' risk of bias. Overall quality of evidence was assessed through the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) tool. **Results**: Initial screening of databases resulted in 510 studies, of which 43 were excluded for being duplicates. Of 457 eligible papers, ten studies met the inclusion criteria and were selected for full-text reading. Six studies were excluded for not having evaluated pharmacological interventions. Four studies were included and one additional study was retrieved from their references. One RCT was classified as unclear risk of bias, three as low risk of bias, and one as high risk of bias. GRADE analysis demonstrated a low quality of evidence. **Conclusions**: With a low certainty of the evidence, it is possible to infer that benzodiazepines do not influence the pain occurrence during the endodontic procedures. However, nitrous oxide gas seems to influence the same parameter positively.


**Key words:** Anxiety, endodontic, intraoperative pain, systematic review

## Introduction

Endodontic treatment is one of the procedures where the relationship between anxiety and pain is commonly found (1–3). The patient often fears the need to perform these procedures because of the negative connotation it has in social awareness and the anticipation of a possible painful experience (4,5).

It is reported that pain perception is related to cognitive and emotional factors, such as previous experiences, patient's understanding of the procedures to be performed, and perception of sounds and movements during the procedures, and that the anxiety generated can result in a higher occurrence of pain during the endodontic treatments (6–8).

Conscious sedation is presented as an option to manage the patient's anxiety and pain experience (9,10). According to the American Association of Anesthesiologists, conscious sedation is defined as a reduction of consciousness through pharmacological interventions, in which the patient still demonstrates the ability to respond to verbal commands or mild tactile stimuli (11).

One of the methods to obtain conscious sedation is through benzodiazepines (10,12). These drugs are often administered orally, presenting low toxicity and low capacity to cause dependence (12). However, the inability to manage the dose according to the patient's response and its relatively unpredictable effects are some limitations of these drugs (13).

Another option for achieving conscious sedation in the dental office is through the use of nitrous oxide gas. Its clinical use is considered relatively safe and, in addition to the sedative and hypnotic properties, it also promotes a mild analgesic effect (14,15). Nitrous oxide gas provides a rapid onset of action, and its dosage is obtained with the gradual increase of the drug concentration (14). Its adverse effects generally include gastrointestinal, nervous, and psychiatric disorders (16) and the main limitation is the need for professional qualification to perform the procedures (14,16).

Anxious patients are reported to be twice as likely to experience intraoperative pain (2,17). For this reason, it is essential to understand how to manage anxiety. Besides, the control of anxiety can improve the management of the patient, the

conduction and acceptance of the procedures, and facilitate the completion of the treatment (5).

Once the control of anxiety can present benefits during the endodontic procedures, it is necessary to verify the available information regarding the effectiveness of the pharmacological interventions of anxiety, through the induction of conscious sedation, and the occurrence of intraoperative pain. So far, no systematic review has been performed to evaluate such information. Therefore, the purpose of this systematic review is to answer the following question: "Does the pharmacological management of anxiety influence on pain occurrence during root canal treatment?".

## Material and Methods

This systematic review followed Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) recommendations (http://www prisma-statement.org) and was registered on the PROSPERO database under number CRD42021226740.

### Search strategy

The search was performed independently by two examiners (I.A.S. e C.J.D.A.) in the following electronic databases: MEDLINE/PubMed, Cochrane Library, Web of Science, Scopus, EMBASE, and Open Grey. The search was conducted for articles published until December 2020, without language or year restriction. The electronic search strategy was developed using the most cited descriptors in previous publications on this theme combining Medical Subject Heading (MeSH) terms and text words (tw.). For each database, the following terms were combined: 'Root canal', 'Root canal therapy', 'Root canal treatment', 'Endodont*', 'Dental anxiety', 'Anxiety', 'Pain', 'Intraoperative pain', 'Pain control', 'Analgesia', 'Anesthetic', 'Anesthesia'. The Boolean operators' 'AND' and 'OR' were applied to combine the terms and create a search strategy.

The search strategies for each database and the following findings are summarized in **Supplementary File 1.**

Additional screening on the selected studies' references was performed, and the related articles were searched in the PubMed database. All articles selected were imported into the Mendeley© (Mendeley Ltd, London, United Kingdom) reference manager to catalogue the references and facilitate the exclusion of duplicates.

Eligibility criteria

The eligibility criteria were based on the PICOS strategy (PRISMA-P 2015) (18,19), as follows:

- Population (P): adult patients undergoing root canal treatment;
- Intervention (I): pharmacological control of anxiety;
- Comparison (C): a control group and/or placebo;
- Outcome (O): Primary: intraoperative pain and/or anesthetic efficacy;
  Secondary: anxiety levels;
- Study design (S): only randomized clinical trials (RCTs)

Selection of the studies

The first stage consisted of excluding the duplicated studies, considering only once, and examining the selected studies' retrieved titles and abstracts by two independent authors (I.A.S. e C.J.D.A.). When it was not possible to judge the studies by title and abstract, the full text was accessed and read for the final decision. The second stage consisted of reading the potentially eligible studies' full texts based on the PICOS strategy's eligibility criteria. Disagreements on study inclusion were solved by a consensus with a third author (T.W.).

Data extraction

Two authors (I.A.S. e C.J.D.A.) independently collected the data from the included studies. Disagreements were solved by a third author (T.W.). The following data were extracted from the included studies: name of the author(s), year of publication, number of participants per group, participants age, anxiety scale, preoperative anxiety scores, pain scale, preoperative pain scores, anesthetic technique, endodontic intervention, pharmacological intervention, control group, drug administration protocol, moments of evaluation, outcomes and main findings. In cases of missing data, the authors were contacted three times by e-mail.

Quality assessment and strength of evidence

The methodological risk assessment of bias for each study was performed by two independent authors (I.A.S. e C.J.D.A.), and, in case of disagreement, it was resolved by a third author (T.W.).

The studies' qualitative analysis was performed from the risk of bias assessment using the Cochrane risk of bias tool for randomized clinical trials (RoB 2): 'Bias Risk Assessment of Randomized Controlled Studies' – Cochrane Handbook 6.0 (20).

Each included study was judged as 'high' risk of bias for negative domain response (red), 'low' risk of bias for positive domain response (green), and 'unclear' risk of bias (yellow) when the response was not clear. When the study was judged as 'unclear', the authors were contacted by e-mail at least three times for more information and allowed to be classified as 'low' (green) or 'high' (red) risk of bias. Once this information was not possible to be acquired, the articles remained with some 'unclear' bias risks. Overall quality was based on the scores in individual domains. When it was verified a low risk of bias for all domains, the overall quality was of low risk of bias. When at least one domain was of unclear risk, the overall quality was of unclear risk of bias. The high risk of bias was also scored when at least one domain was assessed as being high or three or more domains were classified as unclear. Each domain was recorded as low, moderate, serious, critical, or no information available for risk of bias. The overall risk of bias judgment was determined by combining the levels of bias in each domain.

The strength of the evidence of the included studies was assessed using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) tool (GRADEpro GDT: GRADEpro Guideline Development Tool [Software]. McMaster University, 2015 - developed by Evidence Prime, Inc.), available from gradepro.org: https://gdt.gradepro.org/app/handbook/handbook.html#h.rkkjpmwb6m6z (21).

## Results

### Study Selection

**Figure 1** presents the flow diagram of the search strategy.

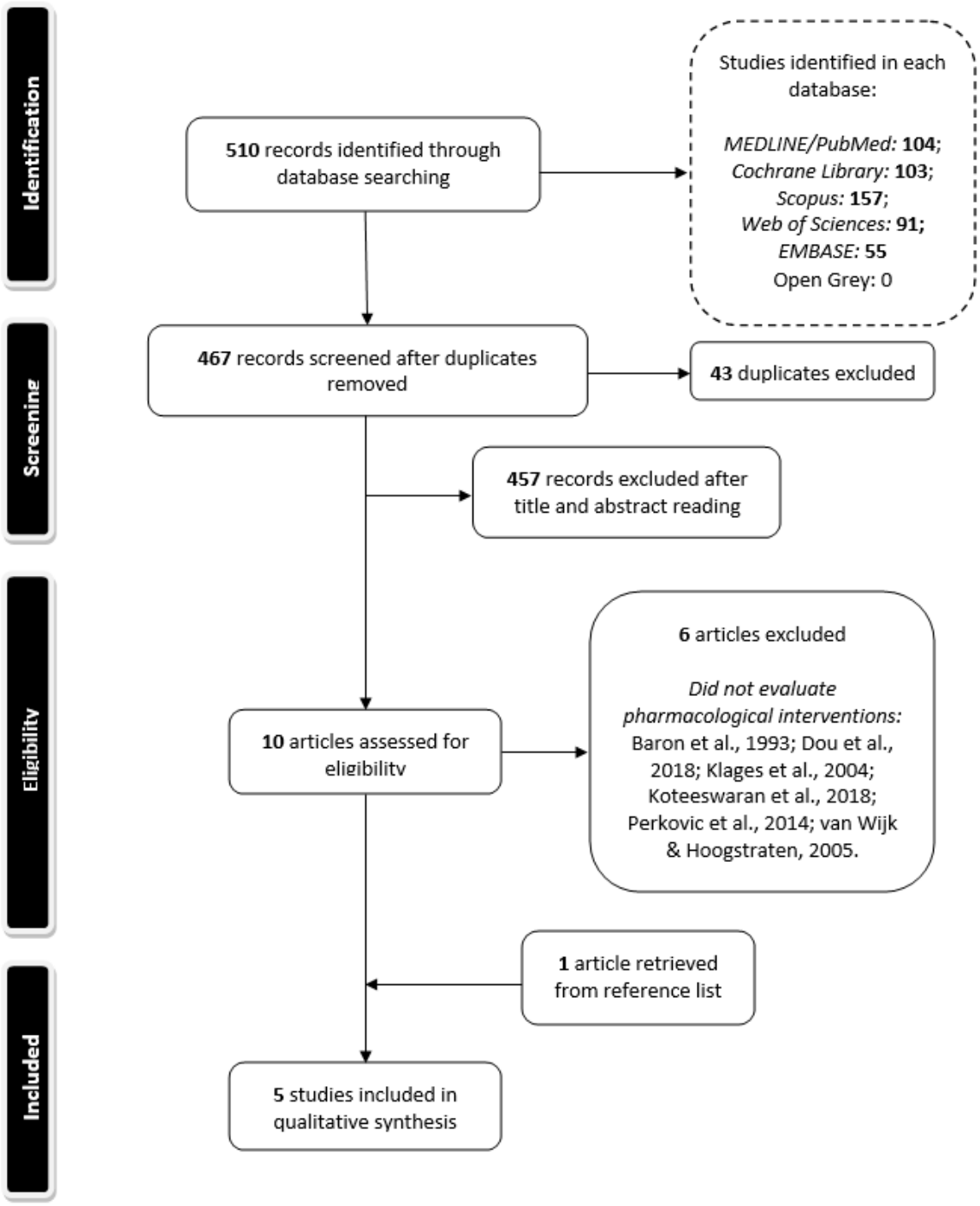



**Figure 1.** PRISMA flow diagram representing the systematic review process.

Initial screening of databases resulted in 510 studies. Of these articles, 43 were excluded as they were duplicates. From the analysis of the titles and abstracts, 457 studies were exclude and ten studies (22–31) met the inclusion criteria and were selected for full-text reading.

Of these, six studies were excluded for not having evaluated pharmacological interventions (22,23,26,27,29,31). One additional study (32) was identified after checking the references of the selected articles. Therefore, five studies met the inclusion criteria and were selected for analysis (24,25,28,30,32).

Data Extraction

**Table 1** presents the characteristics and main findings of the included studies.

Authors of studies with insufficient data were contacted at least three times by e-mail, but no additional information was received.

Regarding the assessment of anxiety level, three studies used Corah Dental Anxiety Scale (CDAS) (28,30,32), one study used the Modified Dental Anxiety Scale (MDAS) (25) and one used Corah Dental Anxiety Scale (CDAS) as an inclusion criterion to assess preoperative anxiety values, and Vertical and Horizontal Visual Analogue Scales (VVAS and HVAS) were used to assess anxiety levels before and after procedures (24).

In relation to the preoperative anxiety levels, two studies found CDAS scores of 11 ± 4 (mean ± SD) to both groups (28,30), one study found CDAS values of 11.1 ± 4.6 to the intervention group and 9.4 ± 4.4 to the placebo group (32), and one study found MDAS scores of 20.27 to the control group and 20.67 to the intervention group (25). One study only included participants with CDAS scores ≥ 10, and the included participants presented preoperative anxiety scores between 20-40mm according to the VVAS. Although reporting the use of HVAS for anxiety level measuring, the values were not reported (24).

Regarding the assessment of pain levels, the majority of studies used Heft-Parker Visual Analogue Scale (VAS) (25,28,30,32), and only one study used Horizontal Visual Analogue Scale (HVAS) (24).

As for the preoperative pain scores, one study found VAS scores of 125 ± 21.1 (mean ± SD) to the intervention group and 124 ± 23.3 to the placebo group (32), one study found VAS values of 109 ± 50 to the intervention group and 106 ± 4 to the placebo group (28), and one study found VAS values of 128 ± 25 to the intervention

group and 130 ± 23 to the placebo group (30). Two studies did not report preoperative pain values (24,25).

Regarding the pharmacological interventions investigated, in one study, patients received 0,25mg triazolam or 5mg diazepam or placebo after completion of the baseline data (24). One study managed 0,5mg alprazolam or placebo, 45 min before inferior alveolar nerve (IAN) block (32), and another study 0,25mg triazolam or placebo 30 min before local anesthesia (28). In one study that used nitrous oxide, 5 min before the administration of local anesthesia, the intervention group received 6L/min of 100% oxygen for 5 min; and 5 min of nitrous oxide (30-50%)/oxygen until sedation; and the control group received only local anesthesia (25). Another study that used nitrous oxide, 10 min before the administration of local anesthesia the intervention group received, during 5 min, 6L/min of 100% oxygen and 5 min of nitrous oxide (30-50%)/oxygen until sedation; and the placebo group received 6L/min of 100% room air/oxygen. Both groups were maintained on their protocols during the entire treatment (30).

About the moments of evaluation of anxiety and pain, three studies evaluated the anxiety and pain levels in baseline and if the patient felt pain during the endodontic procedure (28,30,32). One study evaluated preoperative and postoperative anxiety levels and pain occurrence during local anesthesia administration and access opening (25). One study evaluated the anxiety levels preoperatively as an inclusion criterion, and in several moments during the appointment (45, 30 and 15 min preoperatively; at start of procedure; and 15, 30, 60, 90, 120, and 180 min after the start of the procedures) and pain levels 60 min after the procedures (24).

As for the main findings of the analyzed studies, from those that evaluated the effects of nitrous oxide, one study reported a reduction in the postoperative anxiety scores and the pain perception of patients during anesthesia and access opening (25), and the other study reported an increased in the success rate of the IAN block (30). From those that evaluated the effects of oral medicaments, one study demonstrated a significant decrease in anxiety when a single dose of 0,25mg triazolam was administered before treatment and compared to the placebo group, but without differences regarding pain levels (24). One study that evaluated the administration of 0,5mg alprazolam reported that this medication did not improve the success rate of IAN block (32). Other study, that evaluated the administration of 0,25mg triazolam

sublingual previously to local anesthesia, also reported that this medication did not improve the success rate of the IAN block (28).

Quality Assessment

**Figure 2** summarizes the risk of bias of the randomized clinical trials.

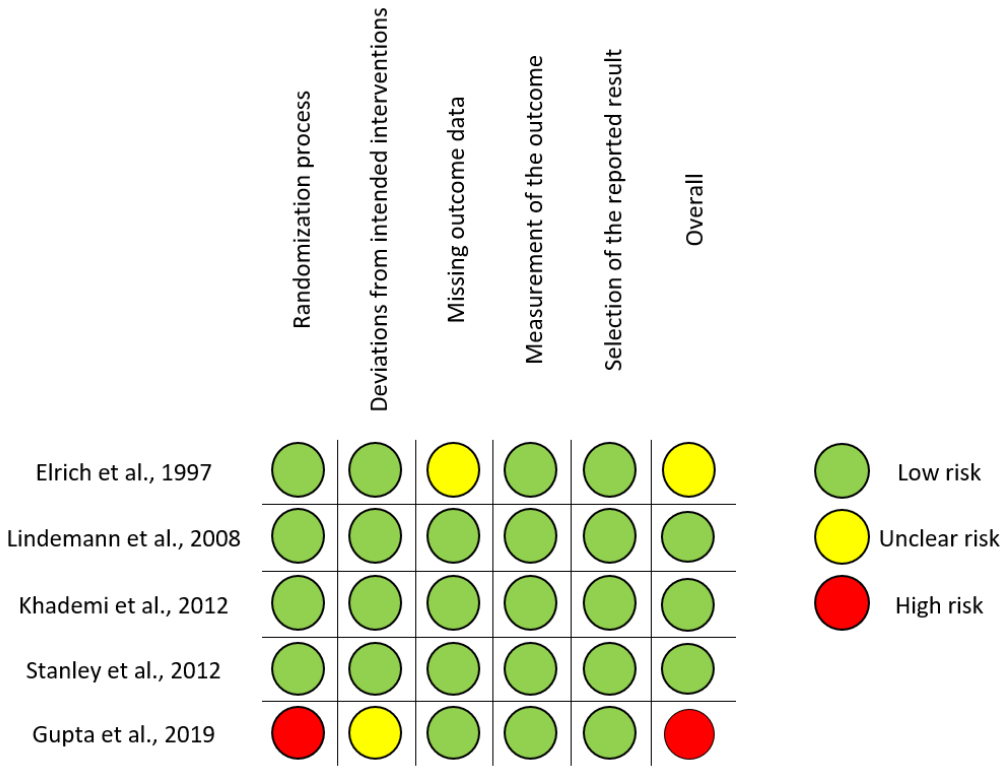



**Figure 2.** Quality assessment of the randomized clinical trials according to Cochrane Collaboration common scheme for bias and RoB 2 tool

From the five studies included for the analyses, three studies were classified as low risk of bias (28,30,32), one study was classified as unclear risk of bias, with one domain (missing outcome data) presenting some concerns (24), and one study was classified as high risk of bias, with one domain (randomization) presenting a high risk of bias and other domain (deviations from intended interventions) presenting some concerns (25).

Strength of Evidence

GRADE results are presented in **Table 2**.

The GRADE tool demonstrated a low quality of evidence for the included studies. These studies received the “serious” classification for risk of bias and imprecision, and “not serious” classification for inconsistency, indirectness, and no other considerations (24,25,28,30,32).

## Discussion

Since it has been reported that the control of anxiety can bring some benefits during the endodontic treatment (2,29), this systematic review aimed to verify if the pharmacological management of anxiety influences the occurrence of intraoperative pain. For this purpose, this systematic review included studies that performed the control of anxiety through benzodiazepines and nitrous oxide gas. These sedation methods were selected because both promote a minimum sedation level, maintaining the patient consciousness without impairing respiratory and cardiovascular functions (13,33).

This systematic review was conducted with a robust methodology, registered in the PROSPERO database, performing the searches in six electronic databases by two independent authors involved in the study's selection and data extraction. To provide a reliable source of knowledge around the question raised in this study, only randomized clinical trials that evaluated pharmacological interventions to control anxiety were included. Besides, all selected studies had compared the intervention to a control or placebo group.

Regarding the studies' risk of bias assessment, significant concerns were observed in three domains (randomization process, deviations from intended interventions, and missing outcome data). One study (25) did not inform for randomization method and neither for allocation concealment. The same study (25) did not perform blinding for the caregivers and participants, allowing them to know their assigned intervention. Furthermore, one study (24) did not report for all the outcomes evaluated.

Due to these limitations presented by the included studies, the overall quality of evidence presented by the GRADE tool was classified as low. The domain' risk of bias'

includes eligibility criteria, measurement of exposure and outcome, and confounding control (34). In the ‘risk of bias’ domain, the studies received the "serious" classification because one study did not perform allocation concealment and did not perform blinding for participants and caregivers (25), and one study did not present all the measured outcomes (24). The domain' inconsistency' refers to an unexplained heterogeneity of results (35). This domain was considered 'not serious' since all included studies did not seem to present unexplained heterogeneity. The domain 'indirectness' is composed by differences in population, interventions, outcomes measures, and indirect comparisons (36), and it was also considered 'not serious', since all included studies presented more than 3 'no' for the assessed parameters. The domain 'imprecision' was assessed following Murad *et al.* (37). In the present systematic review, a meta-analysis was not possible to be performed, and, for this reason, it could not be assessed the single pooled estimate of the effect. It is recommended, in these situations, to consider the total number of participants of the included studies and the confidence intervals (CIs) of the most extensive studies. A threshold of fewer than 400 concerns imprecision and results may be imprecise when the CIs of the most extensive studies include no effect and meaningful benefits or harms (37). Due to these reasons, the domain ‘imprecision’ was considered “serious”, since the 95% CI of the studies with the widest samples did not include meaningful benefit or harm and their pooled sample size was less than 400. The domain 'other consideration' included the assessment of publication bias, large effect, plausible confounding and dose-response gradient (38,39), and none of them were likely to interfere in the results or downgrade the certainty of the evidence of the included studies.

When evaluating the main findings, conscious sedation through benzodiazepines did not presented better results regarding pain perception (24) and anesthetic efficacy (28,32) compared to the control or placebo groups. However, studies that performed conscious sedation through nitrous oxide gas reported a significant reduction in pain perception during procedures performance (25,30). These results can probably be explained due to the differences in both pharmacological interventions' mechanism of action.

Nitrous oxide gas presents different mechanisms of action for its sedative and analgesic properties. Although the theory around the mechanism of action of its sedative effects is not well established, the most accepted is that the nitrous oxide gas

is a non-competitive inhibitor of the subtype N-Methyl-D-Aspartate (NMDA) glutamate receptor, the primary excitatory neurotransmitter of the central nervous system (40,41). Another potential theory is that the nitrous oxide gas promotes a hyperpolarization of neurons by increasing the potassium conductance on potassium canal such as TREK-1 (42). Regarding the analgesic properties of the nitrous oxide gas, it appears that nitrous oxide induces the release of an opioid peptide in the periaqueductal grey matter (PAG) of the midbrain, leading to the activation of the descending inhibitory pathways, resulting in modulation of the pain at the nociceptive processing in the spinal cord (43).

Meanwhile, benzodiazepines have their mechanism of action related to the inhibition of the polysynaptic pathway through direct interaction with the gamma-Aminobutyric acid (GABA) (44). GABA is an inhibitory neurotransmitter presented in the central nervous system and is divided into three subtypes: GABA-A, GABA-B, and GABA-C (44). The subtype responsible for the effects of the benzodiazepines is the GABA-A receptor, an anion-selective ligand-gated ion canal, composed of five subunits: two alpha (α), two beta (β) and one gamma (γ) (45). These subunits form a canal that crosses the neuron's plasma membrane, where chloride ions pass (46). When benzodiazepines bind to the GABA-A receptor, there is a conformational change in the canal, which results in a more significant influx of chloride ions, leading to a hyperpolarization of the neural plasma membrane and, consequently, an inhibition of the central nervous system (47). Therefore, while nitrous oxide gas acts as a central nervous system depressor and as an opioid-like drug, benzodiazepines only promote a sedative effect.

Regarding adverse reactions of benzodiazepines, it has been reported minimal changes in the patient's respiration rate when therapeutic doses of benzodiazepines were administered (48). Some authors have found a relation between the administration of these drugs with cognitive decline, interfering in recent memories' formation and inducing permanent memory loss if used during long periods (49–52). A previous study (53) showed that former users of benzodiazepines have persistent cognitive deficits in the months following withdrawal. Benzodiazepines can also cause paradoxical reactions, such as increased talkativeness, emotional release, excitement, excessive movement, and even hostility and rage (54). These effects are related to several predisposing risk factors like age, genetic predisposition, alcoholism, and psychiatric or personality disorders (55).

The adverse reactions presented by the nitrous oxide gas can include gastrointestinal disorders, such as vomiting and nausea, and nervous system and psychiatric disorders, mainly agitation and euphoria (16). Also, it has been reported that more serious adverse reactions can occur, and these include conscious disorder, bradycardia, O2 desaturation, laryngospasm, apnea, convulsions, cardiac arrest, and narcolepsy (14,16,56). It is crucial to emphasize that the use of nitrous oxide gas in the dental office should be preceded by an extensive training period for its correct administration, which could minimize the risks of the therapy (14,16).

This systematic review presents some limitations. Mainly due to the high methodological heterogeneity among the retrieved studies, a meta-analysis was not possible to be performed. This systematic review was also limited in verifying if pharmacological interventions could decrease intraoperative pain experiences in endodontic treatments but did not evaluate non-pharmacological therapies.

As for the implications of this systematic review on future research, it was verified the need for more high-quality research on the subject, with a standardization of the adopted methodologies, so that an adequate comparison is possible. This is the first systematic review that correlates the effects of pharmacological control of anxiety through conscious sedation in reducing intraoperative pain experience in endodontic treatments. About the future directions for clinical practice, based on the results of this systematic review, it is possible to suggest that nitrous oxide can present benefits in reducing intraoperative pain during non-surgical endodontic treatment. At the same time, the use of benzodiazepines seems not to be as effective. However, this suggestion is based on a low quality of evidence. Meanwhile, in the absence of better-quality information that can confirm the above suggestions, using any of the referred techniques to control anxiety and promoting a reduction in the intraoperative pain experience should be taken with caution.

## Conclusion

With low certainty of the evidence, the control of anxiety through benzodiazepines does not influence the occurrence of intraoperative pain and anesthetic efficacy, while the administration of nitrous oxide gas seems to be more effective.

References

1. Chen WJ, Carter A, Boschen M, et al. Fear and anxiety pathways associated with root canal treatments amongst a population of East Asian origin. Eur Endod J 2019;5(3):2–5.

2. Murillo-Benítez M, Martín-González J, Jiménez-Sánchez MC, et al. Association between dental anxiety and intraoperative pain during root canal treatment: a cross-sectional study. Int Endod J 2020;53:447–54.

3. Prathima V, Anjum MS, Reddy PP, et al. Assessment of anxiety related to dental treatments among patients attending dental clinics and hospitals in Ranga Reddy District, Andhra Pradesh, India. Oral Health Prev Dent 2014;12:357–64.

4. Grupe DW, Nitschke JB. Uncertainty and anticipation in anxiety: an integrated neurobiological and psychological perspective. Nat Rev Neurosci 2013 20;14:488–501.

5. Khan S, Hamedy R, Lei Y, et a. Anxiety related to nonsurgical root canal treatment: A systematic review. J Endod 2016;42:1726–36.

6. Alroomy R, Kim D, Hochberg R, et al. Factors influencing pain and anxiety before endodontic treatment: A cross-sectional study amongst american individuals. Eur Endod J 2020;5:199–204.

7. Maggirias J, Locker D. Psychological factors and perceptions of pain associated with dental treatment. Community Dent Oral Epidemiol 2002;30:151–9.

8. Yildirim TT, Dundar S, Bozoglan A, et al. Is there a relation between dental anxiety, fear and general psychological status? PeerJ 2017;15:1-11.

9. Goulart JCF, Pinheiro MD, Rodrigues RV, et al. Influence of anxiety on blood pressure and heart rate during dental treatment. Rev Odonto Ciência 2012;27:31–5.

10. Weissheimer T, Gerzson AS, Schwengber HE, et al. Benzodiazepines for conscious sedation in the dental office: literature review. Stomatos 2016;22:42–53.

11. American Society of Anesthesiologists. Continuum of Depth of Sedation: Definition of General Anesthesia and Levels of Sedation/Analgesia. Committee of Origin: Quality Management and Departmental Administration (Approved by the ASA House of Delegates). Asa Stand Guidel 2019;1–2.

12. Corcuera-Flores J, Silvestre-Rangil J, Cutando-Soriano A, et al. Current methods of sedation in dental patients - a systematic review of the literature. Med Oral Patol Oral y Cir Bucal 2016;21:579–86.

13. Ogle OE, Hertz MB. Anxiety control in the dental patient. Dent Clin North Am 2012;56:1–16.

14. Becker DE, Rosenberg M. Nitrous oxide and the inhalation anesthetics. Anesth Prog 2008;55:124–31.

15. Folayan MO, Faponle A, Lamikanra A. A review of the pharmacological approach to the management of dental anxiety in children. Int J Paediatr Dent 2002;12:347–54.

16. Onody P, Gil P, Hennequin M. Safety of inhalation of a 50% nitrous oxide/oxygen premix. Drug Saf 2006;29:633–40.

17. Lin C, Niddam D, Hsu M, et al. Pain catastrophizing is associated with dental pain in a stressful context. J Dent Res 2013;92:130–5.

18. Maia L, Antonio A. Systematic reviews in dental research. A guideline. J Clin Pediatr Dent 2012;37:117–24.

19. Moher D, Shamseer L, Clarke M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Syst Rev 2015;4:1-9.

20. Sterne JAC, Savović J, Page MJ, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. BMJ 2019;366:l-72.

21. Guyatt G, Oxman AD, Akl EA, et al. GRADE guidelines: 1. Introduction—GRADE evidence profiles and summary of findings tables. J Clin Epidemiol 2011;64:383–94.

22. Baron RS, Logan H, Hoppe S. Emotional and sensory focus as mediators of dental pain among patients differing in desired and felt dental control. Heal Psychol 1993;12:381–9.

23. Dou L, Vanschaayk MM, Zhang Y, et al. The prevalence of dental anxiety and its association with pain and other variables among adult patients with irreversible pulpitis. BMC Oral Health 2018;18:1-6.

24. Ehrich DG, Lundgren JP, Dionne RA, et al. Comparison of triazolam, diazepam, and placebo as outpatient oral premedication for endodontic patients. J Endod 1997;23:181–4.

25. Gupta P, Mahajan P, Monga P, et al. Evaluation of the efficacy of nitrous oxide inhalation sedation on anxiety and pain levels of patients undergoing endodontic treatment in a vital tooth: A prospective randomized controlled trial. J Conserv Dent 2019;22:1-4.

26. Klages U, Ulusoy O, Kianifard S, et al. Dental trait anxiety and pain sensitivity as predictors of expected and experienced pain in stressful dental procedures. Eur J Oral Sci 2004;112:477–83.

27. Koteeswaran V, Ballal S, Natanasabapathy V, et al. Efficacy of Endo-Ice followed by intrapulpal ice application as an adjunct to inferior alveolar nerve block in patients with symptomatic irreversible pulpitis—a randomized controlled trial. Clin Oral Investig 2019;23:3501–7.

28. Lindemann M, Reader A, Nusstein J, et al. Effect of sublingual triazolam on the success of inferior alveolar nerve block in patients with irreversible pulpitis. J Endod 2008;34:1167–70.

29. Perković I, Perić M, Romić Knežević M, et al. The level of anxiety and pain perception of endodontic patients. Acta Stomatol Croat 2014;48:258–67.

30. Stanley W, Drum M, Nusstein J, et al. Effect of nitrous oxide on the efficacy of the inferior alveolar nerve block in patients with symptomatic irreversible pulpitis. J Endod 2012;38:565–9.

31. van Wijk AJ, Hoogstraten J. Reducing fear of pain associated with endodontic therapy. Int Endod J 2006;39:384–8.

32. Khademi AA, Saatchi M, Minaiyan M, et al. Effect of preoperative alprazolam on the success of inferior alveolar nerve block for teeth with irreversible pulpitis. J Endod 2012;38:1337–9.

33. Jackson DL, Johnson BS. Conscious sedation for dentistry: risk management and patient selection. Dent Clin North Am 2002;46:767–80.

34. Guyatt GH, Oxman AD, Vist G, et al. GRADE guidelines: 4. Rating the quality of evidence—study limitations (risk of bias). J Clin Epidemiol 2011;64:407–15.

35. Guyatt GH, Oxman AD, Kunz R, et al. GRADE guidelines: 7. Rating the quality of evidence—inconsistency. J Clin Epidemiol 2011;64:1294–302.

36. Guyatt GH, Oxman AD, Kunz R, et al. GRADE guidelines: 8. Rating the quality of evidence—indirectness. J Clin Epidemiol 2011;64:1303–10.

37. Murad MH, Mustafa RA, Schünemann HJ, et al. Rating the certainty in evidence in the absence of a single estimate of effect. Evid Based Med 2017;22:85–7.

38. Guyatt GH, Oxman AD, Sultan S, et al. GRADE guidelines: 9. Rating up the quality of evidence. J Clin Epidemiol 2011;64:1311–6.

39. Ryan R, Hill S. How to GRADE the quality of the evidence. Cochrane Consum Commun Gr 2016;3:1–24.

40. Jevtović-Todorović V, Todorovć SM, Mennerick S, et al. Nitrous oxide (laughing gas) is an NMDA antagonist, neuroprotectant and neurotoxin. Nat Med 1998;4:460–3.

41. Sato Y, Kobayashi E, Murayama T, et al. Effect of N -methyl-d-aspartate receptor ε1subunit gene disruption of the action of general anesthetic drugs in mice. Anesthesiology 2005;102:557–61.

42. Gruss M, Bushell TJ, Bright DP, et al. Two-pore-domain K+ channels are a novel target for the anesthetic gases xenon, nitrous oxide, and cyclopropane. Mol

Pharmacol 2004;65:443–52.

43. Fujinaga M, Maze M. Neurobiology of nitrous oxide-induced antinociceptive effects. Mol Neurobiol 2002;25:167–90.

44. Cornett EM, Novitch MB, Brunk AJ, et al. New benzodiazepines for sedation. Best Pract Res Clin Anaesthesiol 2018;32:149–64.

45. Sigel E, Steinmann ME. Structure, function, and modulation of GABA A receptors. J Biol Chem 2012;287:40224–31.

46. Griffin CE, Kaye AM, Rivera Bueno F, et al. Benzodiazepine pharmacology and central nervous system-mediated effects. Ochsner J 2013;13:214–23.

47. Kelly MD, Smith A, Banks G, et al. Role of the histidine residue at position 105 in the human α5 containing GABA A receptor on the affinity and efficacy of benzodiazepine site ligands. Br J Pharmacol 2002;135:248–56.

48. Berthold CW, Schneider A, Dionne RA. Using triazolam to reduce dental anxiety. J Am Dent Assoc 1993;124:58–64.

49. Barker MJ, Greenwood KM, Jackson M, et al. Cognitive effects of long-term benzodiazepine use. CNS Drugs 2004;18:37–48.

50. Gage SB de, Moride Y, Ducruet T, et al. Benzodiazepine use and risk of Alzheimer's disease: case-control study. BMJ 2014;349:1-10.

51. Uzun S, Kozumplik O, Jakovljević M, et al. Side effects of treatment with benzodiazepines. Psychiatr Danub 2010;22:90–3.

52. Wu C-S, Wang S-C, Chang I-S, et al. The association between dementia and long-term use of benzodiazepine in the elderly: Nested case–control study using claims data. Am J Geriatr Psychiatry 2009;17:614–20.

53. Verdoux H, Lagnaoui R, Begaud B. Is benzodiazepine use a risk factor for cognitive decline and dementia? A literature review of epidemiological studies. Psychol Med 2005;35:307–15.

54. Hall R, Zisook S. Paradoxical reactions to benzodiazepines. Br J Clin Pharmac

1981;11:99–104.

55. Mancuso CE, Tanzi MG, Gabay M. Paradoxical reactions to benzodiazepines: literature review and treatment options. Pharmacotherapy 2004;24:1177–85.

56. Bonafe-Monzo N, Rojo-Moreno J, Catala-Pizarro M. Analgesic and physiological effects in conscious sedation with different nitrous oxide concentrations. J Clin Exp Dent 2015;7:63–8.

Supplementary File 1. Search strategy in each database.

| Database | Search strategy | Findings |
|---|---|---|
| MEDLINE/PubMed | #1: (((((((root canal[MeSH Terms]) OR (root canal[Title/Abstract])) OR (root canal therapy[MeSH Terms])) OR (root canal therapy[Title/Abstract])) OR (root canal treatment[MeSH Terms])) OR (root canal treatment[Title/Abstract])) OR (endodont*[MeSH Terms])) OR (endodont*[Title/Abstract]) | 44.877 |
| | #2: (((dental anxiety[MeSH Terms]) OR (dental anxiety[Title/Abstract])) OR (anxiety[MeSH Terms])) OR (anxiety[Title/Abstract]) | 225.630 |
| | #3: ((((((((((pain[MeSH Terms]) OR (pain[Title/Abstract])) OR (intraoperative pain[MeSH Terms])) OR (intraoperative pain[Title/Abstract])) OR (pain control[MeSH Terms])) OR (pain control[Title/Abstract])) OR (analgesia[MeSH Terms])) OR (analgesia[Title/Abstract])) OR (anesthetic[MeSH Terms])) OR (anesthetic[Title/Abstract])) OR | 1.101.476 |

| | | |
|---|---|---|
| | (anesthesia[MeSH Terms])) OR (anesthesia[Title/Abstract]) | |
| | #1 AND #2 AND #3 | 104 |
| Cochrane Library | #1: root canal OR root canal therapy OR root canal treatment OR endodont* | 4.410 |
| | #2: dental anxiety OR anxiety | 54.304 |
| | #3: pain OR intraoperative pain OR pain control OR analgesia OR anesthetic OR anesthesia | 242.970 |
| | #1 AND #2 AND #3 | 103 |
| Scopus | #1: ( TITLE-ABS-KEY ( root AND canal ) OR TITLE-ABS-KEY ( root AND canal AND therapy ) OR TITLE-ABS-KEY ( root AND canal AND treatment ) OR TITLE-ABS-KEY ( endodont* ) ) | 59.288 |
| | #2: ( TITLE-ABS-KEY ( dental AND anxiety ) OR TITLE-ABS-KEY ( anxiety ) | 401.484 |
| | #3: ( TITLE-ABS-KEY ( pain ) OR TITLE-ABS-KEY ( intraoperative AND pain ) OR TITLE-ABS-KEY ( pain AND control ) OR TITLE-ABS-KEY ( analgesia ) OR TITLE-ABS-KEY (anesthetic ) OR TITLE-ABS-KEY (anesthesia) ) | 1.619.091 |
| | #1 AND #2 AND #3 | 157 |
| Web of Science (All Databases) | #1: TOPIC: (root canal) OR TOPIC: (root canal therapy) OR TOPIC: (root canal treatment) OR TOPIC: (endodont*) | 38.595 |
| | #2: TOPIC: (dental anxiety) OR TOPIC: (anxiety) | 396.714 |
| | #3: TOPIC: (pain) OR TOPIC: (intraoperative pain) OR TOPIC: (pain control) OR TOPIC: (analgesia) | 1.326.871 |

| | | |
|---|---|---|
| | OR TOPIC: (anesthetic) OR TOPIC: (anesthesia) | |
| | #1 AND #2 AND #3 | 91 |
| EMBASE | #1: 'root canal':ti,ab,kw OR 'root canal therapy':ti,ab,kw OR 'root canal treatment':ti,ab,kw OR endodont*:ti,ab,kw | 30.282 |
| | #2: 'dental anxiety':ti,ab,kw OR anxiety:ti,ab,kw | 291.787 |
| | #3: pain:ti,ab,kw OR 'intraoperative pain':ti,ab,kw OR 'pain control':ti,ab,kw OR analgesia:ti,ab,kw OR anesthetic:ti,ab,kw OR anesthesia:ti,ab,kw | 1.218.413 |
| | #1 AND #2 AND #3 | 55 |
| Open Grey | #1: (“root canal” OR “root canal therapy” OR “root canal treatment” OR “endodont*”) | 465 |
| | #2: (“dental anxiety” OR “anxiety”) | 1.317 |
| | #3: (“pain” OR “intraoperative pain” OR “pain control” OR “analgesia” OR “anesthetic” OR “anesthesia”) | 3.047 |
| | #1 AND #2 AND #3 | 0 |

Table 1 – Data extracted from the included studies.

| Author (s) (Year of publication) | Number of participants (per group) | Participants age (per group) | Anxiety scale | Preoperative anxiety scores | Pain scale | Preoperative pain scores | Anesthetic technique | Endodontic intervention | Pharmacological intervention | Control group | Drug administration protocol | Moments of evaluation | Outcomes | Main findings |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ehrich DG. (1997) | 79 (Triazolam group: 25; Diazepam group: 26; Placebo group: 28) | NR | Vertical and horizontal visual analogue scales (VVAS and HVAS) | VVAS: Range of 20-40mm; HVAS: NR* | Horizontal visual analogue scale (HVAS) | NR | NR | NR | 0,25mg triazolam; 5mg diazepam | Placebo | 0,25mg triazolam or 5mg diazepam or placebo after completion of the baseline data | Anxiety: 45, 30 and 15 min before the procedures; at the start of procedure; 15, 30, 60, 90, 120 and 180 min after the start of the procedures; Pain: 60 min after procedures | Anxiety: VVAS: Triazolam significantly decreased anxiety compared to placebo; Diazepam was similar to placebo Pain: HVAS: No differences between groups | Single dose of 0,25mg triazolam prior to treatment is safe in decreasing anxiety; None of the medications improved pain control |
| Lindemann M. et al (2008) | 58 (Triazolam group: 30; Placebo group: 28) | Triazolam group: 37±12; Placebo group: 28±12 | Corah Dental Anxiety Scale (CDAS) | Triazolam group: 11±4; Placebo group: 11±4 | Heft-Parker Visual Analogue Scale (VAS) | Triazolam group: 109±50mm; Placebo group: 106±4mm | IAN block with 3.6 mL of 2% lidocaine with 1:100,000 epinephrine | Mandibular posterior tooth (molar or premolar) with irreversible pulpitis | 0,25mg triazolam and local anesthesia | Placebo and local anesthesia | 0,25mg triazolam/placebo, 30 min before IAN block | Anxiety: Baseline (previous to drug administration) Pain: Baseline and if patient felt pain during endodontic procedure | Anesthetic success rate was 43% with triazolam and 57% with placebo, without differences between groups | 0,25mg triazolam sublingual did not result in an increase in the success of lower alveolar nerve block |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Khademi AA. et al (2012) | 60 (Alprazolam group: 30; Placebo group: 30) | Alprazolam group: 29±8; Placebo group: 29±8 | Corah Dental Anxiety Scale (CDAS) | Alprazolam group: 11.1±4.6; Placebo group: 9.4 ±4.4 | Heft-Parker Visual Analogue Scale (VAS) | Alprazolam group: 125±21.1 mm; Placebo group: 124 ±23.3mm | Inferior alveolar nerve (IAN) block with 3.6 mL of 2% lidocaine with 1:100,000 epinephrine | Mandibular molar with irreversible pulpitis | 0,5mg alprazolam and local anesthesia | Placebo and local anesthesia | 0,5mg alprazolam capsule or placebo 45 min before IAN block | <u>Anxiety:</u> Baseline<br><br><u>Pain:</u> Baseline and if patient felt pain during endodontic procedure | There were no statistically significant differences in IAN block success rate between groups (Alprazolam: 53%; Placebo: 40%) | Preoperative dose of 0,5mg alprazolam did not improved success rate of IAN block |
| Stanley W. et al (2012) | 100 (Nitrous oxide/oxygen – intervention group: 50; Room air/oxygen - placebo - group: 50) | Nitrous oxide group: 33±11; Placebo group: 35±13 | Corah Dental Anxiety Scale (CDAS) | Nitrous oxide group: 11±4; Placebo group: 11±4 | Heft-Parker Visual Analogue Scale (VAS) | Intervention group: 128±25mm; Placebo group: 130±23mm | Inferior alveolar nerve (IAN) block with 3.6 mL of 2% lidocaine with 1:100,000 epinephrine | Mandibular molar with irreversible pulpitis | Local anesthesia and nitrous oxide/oxygen | Local anesthesia and room air/oxygen (placebo) | <u>Nitrous oxide group:</u> 10 min before local anesthesia; 6L/min - 5 min of 100% oxygen and 5 min of nitrous oxide (30-50%)/oxygen until sedation<br><br><u>Placebo group:</u> 10 min before local anesthesia; 6L/min – 100% room air/oxygen; | <u>Anxiety:</u> Baseline<br><br><u>Pain:</u> Baseline and if patient felt pain during endodontic procedure | There was a significantly higher anesthetic success rate in the nitrous oxide/oxygen group (50%) compared to the placebo group (28%) | Administration of 30%/50% nitrous oxide/oxygen resulted in an increase in the success rate of the IAN block |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gupta P. et al (2019) | 60 (Control group: 30; Nitrous oxide group: 30) | ≥ 18 years | Modified Dental Anxiety Scale (MDAS) | MDAS - Nitrous oxide group: 20.27; MDAS - Intervention group: 20.67 | Heft-Parker Visual Analogue Scale (VAS) | NR | Inferior alveolar nerve block (IANB) with 3,6 mL of lidocaine 2% with epinephrine 1:100.000 | Mandibular molar with irreversible pulpitis | Local anesthesia and nitrous oxide/oxygen | Local anesthesia only | Nitrous oxide group: 5 min before local anesthesia; 6L/min - 5 min of 100% oxygen and 5 min of nitrous oxide (30-50%)/oxygen until sedation | Anxiety: Preoperative and postoperative; Pain: During administration of local anesthesia and access opening | Significant reduction in postoperative anxiety scores in intervention group; Significant reduction in pain perceived by patients during anesthesia and access opening in intervention's group | Nitrous oxide effectively reduced painful perception during treatment and anxiety |

*NR – Not Reported

**Table 2.** Quality of evidence for the pharmacological management of anxiety on pain occurrence during root canal treatment.

| | Certainty assessment | | | | | | |
|---|---|---|---|---|---|---|---|
| **№ of studies** | **Study design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **Overall certainty of evidence** |
| 5 | Randomized trials | Serious[a] | Not serious | Not serious | Serious [b] | None | ⊕⊕◯◯ LOW |

a. 1 study did not perform allocation concealment and did not perform blinding for patients and caregivers; 1 study did not present all the measured outcomes.; b. Pool sample size lower than 400.

## 4. CONSIDERAÇÕES FINAIS

Diante dos achados dessa revisão sistemática, é indiscutível que há a necessidade de novos estudos sobre o manejo farmacológico da ansiedade e o seu impacto na dor intraoperatória de pacientes com necessidade de tratamento endodôntico.

O tratamento endodôntico de dentes vitais é um desafio para o clínico. Como já explicado anteriormente, a dor é uma experiência sensorial e emocional desagradável, associada a um dano potencial ou real. Entretanto, sua percepção é resultante de uma complexa interpretação da excitação sensorial integrada, com emoções como medo, ansiedade, e memórias de experiências anteriores (LOPES; SIQUEIRA, 2020).

Ensaios clínicos randomizados são o padrão ouro para o desenvolvimento de pesquisa com seres humanos. No entanto, são propensos a vieses. Isso pode ser explicado pela arbitrariedade dos investigadores na seleção da amostra e aferição das variáveis analisadas, e na dificuldade no controle de outros fatores que podem influenciar no desfecho clínico (FLETCHER, 2014). Nessa revisão sistemática, mesmo com algumas limitações, o uso do gás de óxido nitroso parece ter melhores resultados no controle da dor, em comparação com os benzodiazepínicos. Um estudo que utilizou esse fármaco como intervenção (GRUPTA *el al*., 2019) foi classificado como alto risco de viés. Em sua metodologia, nos pacientes do grupo experimental, foi realizada abertura coronária e extirpação pulpar sob anestesia local e gás de óxido nitroso. No grupo controle, apenas anestesia local; diferentemente de Stanley *et al*. (2012), que utilizou óxido nitroso/oxigênio ou ar ambiente/oxigênio de maneira aleatória. A ausência de descrição sobre o processo de randomização, além do não-cegamento dos profissionais e pacientes no estudo de Grupta *et al.,* (2019), colaborou para uma baixa qualidade de evidência.

No Brasil, a analgesia relativa ou sedação consciente foi garantida para os cirurgiões-dentistas em 2004 pelo Brazilian College of Dentists (BCD). Para se tornar

apto a praticar a sedação consciente com óxido nitroso, o profissional deve realizar um curso de treinamento com carga horária de 96 horas. Daher *et al*. (2012) procuraram identificar as práticas atuais e opiniões de dentistas brasileiros licenciados para realizar a sedação consciente com óxido nitroso. Os profissionais entrevistados responderam que a maior motivação para realizar o curso é a possibilidade de dar um maior conforto para pacientes com ansiedade dentária. Desses profissionais, 22% eram especialistas em odontopediatria, 18% em cirurgia bucomaxilofacial, 17% implantodontistas e 14% eram de outra especialidade. Outro dado interessante foi que 76,2% trabalhavam nas regiões Sul e Sudeste, onde há maior concentração de profissionais especialistas e cursos para essa prática (DAHER *et al.*, 2012). É de se ressaltar, portanto, que o uso da sedação consciente com o gás de óxido nitroso ainda não é uma realidade para todos os profissionais no país.

## 5. CONCLUSÃO

Diante do exposto e considerando as limitações desta revisão sistemática, é possível concluir que, apesar da baixa certeza das evidências, os benzodiazepínicos não influenciam na ocorrência de dor durante os procedimentos endodônticos. No entanto, o gás de óxido nitroso parece influenciar positivamente o mesmo parâmetro.

## REFERÊNCIAS

AJ, W.; J, H. Reducing fear of pain associated with endodontic therapy. **Int Endod J**, v. 39, p. 384–8, 2006.

ALROOMY, R.; KIM, D.; HOCHBERG, R. Factors influencing pain and anxiety before endodontic treatment: A cross-sectional study amongst american individuals. **Eur Endod J**, v. 5, p. 199–204, 2020.

ANESTHESIOLOGISTS, A. S. Continuum of Depth of Sedation: Definition of General Anesthesia and Levels of Sedation/Analgesia. Committee of Origin: Quality Management and Departmental Administration (Approved by the ASA House of Delegates. **Asa Stand Guidel**, v. 1–2, 2019.

Association between dental anxiety and intraoperative pain during root canal treatment: a cross-sectional study. **Int Endod J**, v. 53, p. 447–54, 2020.

BARKER, M. J.; GREENWOOD, K. M.; JACKSON, M. Cognitive effects of long-term benzodiazepine use. **CNS Drugs**, v. 18, p. 37–48, 2004.

BARON, R. S.; LOGAN, H.; HOPPE, S. Emotional and sensory focus as mediators of dental pain among patients differing in desired and felt dental control. **Heal Psychol**, v. 12, p. 381–9, 1993.

BECKER, D. E.; ROSENBERG, M. Nitrous oxide and the inhalation anesthetics. **Anesth Prog**, v. 55, p. 124–31, 2008.

BERTHOLD, C. W.; SCHNEIDER, A.; DIONNE, R. A. Using triazolam to reduce dental anxiety. **J Am Dent Assoc**, v. 124, p. 58–64, 1993.

BONAFE-MONZO, N.; ROJO-MORENO, J.; CATALA-PIZARRO, M. Analgesic and physiological effects in conscious sedation with different nitrous oxide concentrations. **J Clin Exp Dent**, v. 7, p. 63–8, 2015.

CHEN, W. J.; CARTER, A.; BOSCHEN, M. Fear and anxiety pathways associated with root canal treatments amongst a population of East Asian origin. **Eur Endod J**, v. 5, n. 3, p. 2–5, 2019.

CORCUERA-FLORES, J.; SILVESTRE-RANGIL, J.; CUTANDO-SORIANO, A. Current methods of sedation in dental patients - a systematic review of the literature. **Med Oral Patol Oral y Cir Bucal**, v. 21, p. 579–86, 2016.

CORNETT, E. M.; NOVITCH, M. B.; BRUNK, A. J. New benzodiazepines for sedation. **Best Pract Res Clin Anaesthesiol**, v. 32, p. 149–64, 2018.

DAHER, A. Practices and opinions on nitrous oxide/oxygen sedation from dentists licensed to perform relative analgesia in Brazil. **BMC Oral Health**, v. v. 12, p. 21, 2012.

DE, G. S. B.; Y, M.; T, D. Benzodiazepine use and risk of Alzheimer's disease: case-control study. **BMJ**, v. 349, p. 1–10, 2014.

DOU, L.; VANSCHAAYK, M. M.; ZHANG, Y. The prevalence of dental anxiety

and its association with pain and other variables among adult patients with irreversible pulpitis. **BMC Oral Health**, v. 18, p. 1–6, 2018.

EHRICH, D. G.; LUNDGREN, J. P.; DIONNE, R. A. Comparison of triazolam, diazepam, and placebo as outpatient oral premedication for endodontic patients. **J Endod**, v. 23, p. 181–4, 1997.

FLETCHER, R. H. **Epidemiologia Clínica: Elementos Essenciais**. S.l: Artmed, 2014.

FOLAYAN, M. O.; FAPONLE, A.; LAMIKANRA, A. A review of the pharmacological approach to the management of dental anxiety in children. **Int J Paediatr Dent**, v. 12, p. 347–54, 2002.

FUJINAGA, M.; MAZE, M. Neurobiology of nitrous oxide-induced antinociceptive effects. **Mol Neurobiol**, v. 25, p. 167–90, 2002.

GOULART, J. C. F.; PINHEIRO, M. D.; RODRIGUES, R. V. Influence of anxiety on blood pressure and heart rate during dental treatment. **Rev Odonto Ciência**, v. 27, p. 31–5, 2012.

GRIFFIN, C. E.; KAYE, A. M.; RIVERA BUENO, F. Benzodiazepine pharmacology and central nervous system-mediated effects. **Ochsner J**, v. 13, p. 214–23, 2013.

GRUPE, D. W.; NITSCHKE, J. B. Uncertainty and anticipation in anxiety: an integrated neurobiological and psychological perspective. **Nat Rev Neurosci**, v. 14, p. 488–501, 2013.

GRUSS, M.; BUSHELL, T. J.; BRIGHT, D. P. Two-pore-domain K+ channels are a novel target for the anesthetic gases xenon, nitrous oxide, and cyclopropane. **Mol Pharmacol**, v. 65, p. 443–52, 2004.

GUPTA, P.; MAHAJAN, P.; MONGA, P. Evaluation of the efficacy of nitrous oxide inhalation sedation on anxiety and pain levels of patients undergoing endodontic treatment in a vital tooth: A prospective randomized controlled trial. **J Conserv Dent**, v. 22, p. 1–4, 2019.

GUYATT, G. H.; OXMAN, A. D.; KUNZ, R. GRADE guidelines: 7. Rating the quality of evidence—inconsistency. **J Clin Epidemiol**, v. 64, p. 1294–302, 2011a.

GUYATT, G. H.; OXMAN, A. D.; KUNZ, R. GRADE guidelines: 8. Rating the quality of evidence—indirectness. **J Clin Epidemiol**, v. 64, p. 1303–10, 2011b.

GUYATT, G. H.; OXMAN, A. D.; SULTAN, S. GRADE guidelines: 9. Rating up the quality of evidence. **J Clin Epidemiol**, v. 64, p. 1311–6, 2011.

GUYATT, G. H.; OXMAN, A. D.; VIST, G. GRADE guidelines: 4. Rating the quality of evidence—study limitations (risk of bias. **J Clin Epidemiol**, v. 64, p. 407–15, 2011.

GUYATT, G.; OXMAN, A. D.; AKL, E. A. GRADE guidelines: 1. Introduction—

GRADE evidence profiles and summary of findings tables. **J Clin Epidemiol**, v. 64, p. 383–94, 2011.

HALL, R.; ZISOOK, S. Paradoxical reactions to benzodiazepines. **Br J Clin Pharmac**, v. 11, p. 99–104, 1981.

JACKSON, D. L.; JOHNSON, B. S. Conscious sedation for dentistry: risk management and patient selection. **Dent Clin North Am**, v. 46, p. 767–80, 2002.

KELLY, M. D.; SMITH, A.; BANKS, G. Role of the histidine residue at position 105 in the human α5 containing GABA A receptor on the affinity and efficacy of benzodiazepine site ligands. **Br J Pharmacol**, v. 135, p. 248–56, 2002.

KHADEMI, A. A.; SAATCHI, M.; MINAIYAN, M. Effect of preoperative alprazolam on the success of inferior alveolar nerve block for teeth with irreversible pulpitis. **J Endod**, v. 38, p. 1337–9, 2012.

KHAN, S. et al. Anxiety related to nonsurgical root canal treatment: A systematic review. **J Endod**, v. 42, p. 1726–36, 2016.

KLAGES, U.; ULUSOY, O.; KIANIFARD, S. Dental trait anxiety and pain sensitivity as predictors of expected and experienced pain in stressful dental procedures. **Eur J Oral Sci**, v. 112, p. 477–83, 2004.

KOTEESWARAN, V.; BALLAL, S.; NATANASABAPATHY, V. Efficacy of Endo-Ice followed by intrapulpal ice application as an adjunct to inferior alveolar nerve block in patients with symptomatic irreversible pulpitis—a randomized controlled trial. **Clin Oral Investig**, v. 23, p. 3501–7, 2019.

LIN, C.; NIDDAM, D.; HSU, M. Pain catastrophizing is associated with dental pain in a stressful context. **J Dent Res**, v. 92, p. 130–5, 2013.

LINDEMANN, M.; READER, A.; NUSSTEIN, J. Effect of sublingual triazolam on the success of inferior alveolar nerve block in patients with irreversible pulpitis. **J Endod**, v. 34, p. 1167–70, 2008.

MAGGIRIAS, J.; LOCKER, D. Psychological factors and perceptions of pain associated with dental treatment. **Community Dent Oral Epidemiol**, v. 30, p. 151–9, 2002.

MAIA, L.; ANTONIO, A. Systematic reviews in dental research. A guideline. **J Clin Pediatr Dent**, v. 37, p. 117–24, 2012.

MANCUSO, C. E.; TANZI, M. G.; GABAY, M. Paradoxical reactions to benzodiazepines: literature review and treatment options. **Pharmacotherapy**, v. 24, p. 1177–85, 2004.

MOHER, D.; SHAMSEER, L.; CLARKE, M. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. **Syst Rev**, v. 4, p. 1–9, 2015.

MURAD, M. H.; MUSTAFA, R. A.; SCHÜNEMANN, H. J. Rating the certainty in

evidence in the absence of a single estimate of effect. **Evid Based Med**, v. 22, p. 85–7, 2017.

Nitrous oxide (laughing gas) is an NMDA antagonist, neuroprotectant and neurotoxin. **Nat Med**, v. 4, p. 460–3, 1998.

OGLE, O. E.; HERTZ, M. B. Anxiety control in the dental patient. **Dent Clin North Am**, v. 56, p. 1–16, 2012.

ONODY, P.; GIL, P.; HENNEQUIN, M. Safety of inhalation of a 50% nitrous oxide/oxygen premix. **Drug Saf**, v. 29, p. 633–40, 2006.

PERKOVIĆ, I.; PERIĆ, M.; ROMIĆ KNEŽEVIĆ, M. The level of anxiety and pain perception of endodontic patients. **Acta Stomatol Croat**, v. 48, p. 258–67, 2014.

PRATHIMA, V.; ANJUM, M. S.; REDDY, P. P. **Assessment of anxiety related to dental treatments among patients attending dental clinics and hospitals in Ranga Reddy District, Andhra Pradesh, India**. [s.l: s.n.].

RYAN, R.; HILL, S. How to GRADE the quality of the evidence. **Cochrane Consum Commun Gr**, v. 3, p. 1–24, 2016.

SATO, Y.; KOBAYASHI, E.; MURAYAMA, T. Effect of N -methyl-d-aspartate receptor ε1subunit gene disruption of the action of general anesthetic drugs in mice. **Anesthesiology**, v. 102, p. 557–61, 2005.

SIGEL, E.; STEINMANN, M. E. Structure, function, and modulation of GABA A receptors. **J Biol Chem**, v. 287, p. 40224–31, 2012.

STANLEY, W.; DRUM, M.; NUSSTEIN, J. Effect of nitrous oxide on the efficacy of the inferior alveolar nerve block in patients with symptomatic irreversible pulpitis. **J Endod**, v. 38, p. 565–9, 2012.

STERNE, J. A. C.; SAVOVIĆ, J.; PAGE, M. J. RoB 2: a revised tool for assessing risk of bias in randomised trials. **BMJ**, v. 366:l–72, 2019.

UZUN, S.; KOZUMPLIK, O.; JAKOVLJEVIĆ, M. Side effects of treatment with benzodiazepines. **Psychiatr Danub**, v. 22, p. 90–3, 2010.

VERDOUX, H.; LAGNAOUI, R.; BEGAUD, B. Is benzodiazepine use a risk factor for cognitive decline and dementia? A literature review of epidemiological studies. **Psychol Med**, v. 35, p. 307–15, 2005.

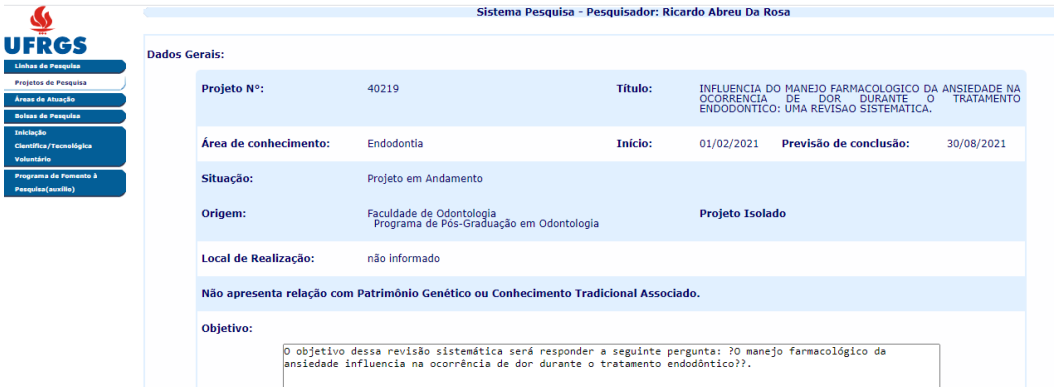
WEISSHEIMER, T.; GERZSON, A. S.; SCHWENGBER, H. E. Benzodiazepines for conscious sedation in the dental office: literature review. **Stomatos**, v. 22, p. 42–53, 2016.

WU, C.-S.; WANG, S.-C.; CHANG, I.-S. The association between dementia and long-term use of benzodiazepine in the elderly: Nested case–control study using claims data. **Am J Geriatr Psychiatry**, v. 17, p. 614–20, 2009.

YILDIRIM, T. T.; DUNDAR, S.; BOZOGLAN, A. Is there a relation between

dental anxiety, fear and general psychological status? **PeerJ**, v. 15, p. 1–11, 2017.

# ANEXO A – APROVAÇÃO COMPESQ



UFRGS

Linhas de Pesquisa
Projetos de Pesquisa
Áreas de Atuação
Bolsas de Pesquisa
Iniciação Científica/Tecnológica Voluntário
Programa de Fomento à Pesquisa(auxílio)

**Sistema Pesquisa - Pesquisador: Ricardo Abreu Da Rosa**

**Dados Gerais:**

| | | | | | |
|---|---|---|---|---|---|
| **Projeto Nº:** | 40219 | **Título:** | INFLUENCIA DO MANEJO FARMACOLOGICO DA ANSIEDADE NA OCORRENCIA DE DOR DURANTE O TRATAMENTO ENDODONTICO: UMA REVISAO SISTEMATICA. | | |
| **Área de conhecimento:** | Endodontia | **Início:** | 01/02/2021 | **Previsão de conclusão:** | 30/08/2021 |
| **Situação:** | Projeto em Andamento | | | | |
| **Origem:** | Faculdade de Odontologia<br>Programa de Pós-Graduação em Odontologia | | **Projeto Isolado** | | |
| **Local de Realização:** | não informado | | | | |

**Não apresenta relação com Patrimônio Genético ou Conhecimento Tradicional Associado.**

**Objetivo:**

O objetivo dessa revisão sistemática será responder a seguinte pergunta: ?O manejo farmacológico da ansiedade influencia na ocorrência de dor durante o tratamento endodôntico??.

UFRGS

Linhas de Pesquisa
Projetos de Pesquisa
Áreas de Atuação
Bolsas de Pesquisa
Iniciação Científica/Tecnológica Voluntário
Programa de Fomento à Pesquisa(auxílio)

**Palavras Chave:**

ANSIEDADE; DOR; ENDODONTIA; REVISÃO SISTEMÁTICA.

**Equipe UFRGS:**

**Nome:** Ricardo Abreu da Rosa
Coordenador - Início: 01/02/2021 Previsão de término: 30/08/2021
**Nome:** CHARLES ANDRÉ DALL AGNOL JÚNIOR
Técnico: Digitador - Início: 01/02/2021 Previsão de término: 30/08/2021
**Nome:** Isadora Ames Silva
Ensino: mestrado - Início: 01/02/2021 Previsão de término: 30/08/2021
**Nome:** MARCUS VINICIUS REIS SO
Pesquisador - Início: 01/02/2021 Previsão de término: 30/08/2021
**Nome:** Theodoro Weissheimer
Ensino: mestrado - Início: 01/02/2021 Previsão de término: 30/08/2021

**Avaliações:**

**Comissão de Pesquisa de Odontologia - Aprovado** em 16/03/2021 Clique aqui para visualizar o parecer

**Anexos:**

Projeto Completo **Data de Envio:** 04/03/2021