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Botulinum toxin for the management of bruxism: an overview of reviews protocol

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ABSTRACT

Introduction Bruxism is characterised by a repetitive activity in the masticatory muscles that involves teeth clenching or grinding and/or forceful mandibular movements. Its management is typically initiated when individuals start experiencing the adverse effects of the condition. One of the available intervention forms is the administration of botulinum toxin type A (BoNT-A). Numerous systematic reviews have addressed the use of BoNT-A to manage bruxism; however, the results are controversial. The current overview aims to determine BoNT-A's effectiveness for managing bruxism in relation to placebo, the absence of treatment or alternative interventions in the adult population.

Methods and analysis This study will include systematic reviews (SRs), with or without meta-analysis, aiming to evaluate the efficacy of BoNT-A for bruxism in adults. A broad literature search will be carried out on Cochrane Library, EMBASE, LILACS, Livivo, PubMed/MEDLINE, Scopus, Web of Science and the grey literature. Experts in the topic and reference lists of included SRs will also be consulted. The study selection will be conducted in two phases by two independent reviewers. Data collection will be performed by one author and cross-checked by another. The methodological quality of included SRs will be evaluated using AMSTAR-II. A narrative synthesis will be employed as the formal method to combine individual study data. The overlap across studies will be quantified by the corrected covered area and illustrated by the Graphical Representation of Overlap for Overviews.

Ethics and dissemination This overview does not require ethics approval, as it uses secondary data from previously published studies. The results will be disseminated through the publication in a high-impact journal.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The researchers described the protocol according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols guidelines.
⇒ The authors will conduct a broad literature search across seven databases, grey literature, reference lists of included studies and experts in the field and an experienced health sciences librarian assisted in the development of the search strategy.
⇒ Using multiple reviewers while screening abstracts and full texts enhances the likelihood of identifying the most pertinent studies.
⇒ AMSTAR II will be used to assess the methodological quality of the systematic reviews included.
⇒ A limitation of this overview is the potential heterogeneity of the included systematic reviews regarding eligibility criteria.

INTRODUCTION

Bruxism is characterised by repetitive masticatory muscle activity involving clenching or grinding teeth and forceful mandibular movements.[1] Based on the patient's state of consciousness, this condition can be categorised into two forms: sleep bruxism (SB) and awake bruxism (AB).[2] The prevalence rates for SB and AB in adults have been reported to range from 8–31% and 22–31%, respectively.[3–6]

Evidence indicates that a combination of biological, psychological and lifestyle factors may contribute to bruxism. These include sleep disruptions, genetic predisposition, the activity of specific neurotransmitters and habits like caffeine and alcohol consumption, smoking and drug abuse, as well as emotional stress and anxiety, and the use of certain medications.[7–13]

Bruxism management is typically initiated when individuals start experiencing the adverse effects of the condition,[7] such as tooth wear, dental fractures, restoration failure, masseter and temporalis hypertrophy, headaches and periodontal alterations.[13–19] Interventions for bruxism include occlusal appliances (oral splinting), pharmacological therapies, biofeedback therapies, cannabidiol and miscellaneous therapies (eg, prosthetic rehabilitation and psychological therapies).[9 12 17 20–22] One of the pharmacological therapies available is the administration of botulinum toxin type A (BoNT-A),

which inhibits the release of acetylcholine from presynaptic nerve endings in striated muscle, causing temporary muscle paralysis.[23 24]

Reviews of systematic reviews are referred to by various names in the scientific literature, including umbrella reviews, overviews of reviews, reviews of reviews, summaries of systematic reviews and syntheses of reviews. Fundamentally, they all share the same defining characteristic: a systematic review (SR) is the main, and often the sole, 'study type' considered for inclusion.[25–27] So, an overview is a comprehensive, systematic and critical summary of published SRs, which encompass multiple interventions or epidemiological studies.[28] The extensive perspective provided by an overview is ideal for determining whether the evidence base surrounding a topic or question is consistent or contradictory. In the case of discrepant findings, it is also ideal for exploring and detailing the reasons for such discrepancies.[25–27]

Previous overviews have reviewed the literature in search of alternative management options for bruxism; however, none of them were specific about the efficacy of botulinum toxin.[7 16 20 22 29] Furthermore, previous systematic reviews have shown controversy in their results,[22 30–41] so an overview was undertaken to determine BoNT-A's effectiveness for managing bruxism in adults.

METHODS AND ANALYSIS

An overview protocol based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols[42] was developed and registered at the Open Science Framework platform[43] (online supplemental appendix 1). The study will be reported following the Preferred Reporting Items for Overviews of Reviews statement.[44]

Patient and public involvement

This study does not involve patients. The data obtained are from previous systematic reviews.

Research question

The Participants, Intervention, Control, Outcomes and Study design (PICOS) mnemonic was used as a guide to identify the research question. Box 1 represents the structuring of PICOS used in the review question: 'Is BoNT-A effective for bruxism management in adults?'.

Box 1 'PICOS' mnemonic as a guide to identifying the research question.

Participants: adults with bruxism
Intervention: botulinum toxin type A
Control: placebo, no treatment or other therapy
Outcomes:
Primary: reduction in the number of bruxism events in the masseter and temporal muscles
Secondary: changes in pain, functional movement and maximum bite force
Study design: systematic reviews with or without meta-analysis

Box 2 Criteria for qualifying as a systematic review.

In order to be considered a systematic review, the study must:
1. Have a clearly stated set of objectives with predefined eligibility criteria for studies
2. Have conducted a systematic search that attempted to identify all studies that met the stated eligibility criteria
3. Have employed an explicit, reproducible methodology
4. Have assessed the validity of the findings of the included studies through the risk of bias assessment, for example
5. Have systematically presented and synthesised the characteristics and findings of the included studies

Source: Adapted from the Cochrane Handbook for SRs of Interventions.[45]

Eligibility criteria

Study design

SRs, with or without meta-analysis, that evaluate the efficacy of BoNT-A will be included. To be considered an SR, the study must have employed systematic and explicit methods, following the minimum criteria outlined in Box 2 of the Cochrane Handbook for Systematic Reviews of Interventions.[45] No time and language restrictions will be applied.

The exclusion criteria will be:
1. SR encompassing nonadult age groups;
2. SR that included cases of bruxism caused by or associated with psychological or neurological disorders; cases of bruxism in patients with previous diagnosis of articular joint disorders; and patients who used this therapy to treat other conditions or for aesthetic purposes;
3. SR in which the BoNT-A was applied with other therapies (cointerventions), and it is not possible to isolate the effect of BoNT-A;
4. Publication types apart from SRs, such as primary studies, editorials, letters to the editor, case reports, conference papers and proceedings, book chapters, preprints and patents.

Type of participants

People over 18 years old with bruxism (sleep or awake), regardless of sex, race, ethnic origin, and setting, will be accepted. Bruxism must be diagnosed through clinical inspection, self-report and/or instrumental assessment (polysomnography or electromyography).[2]

Type of intervention

The intervention's effects will be evaluated by comparing:
- BoNT-A versus placebo therapy
- BoNT-A versus no treatment;
- BoNT-A versus other interventions alone (eg, occlusal splints, medications and transcutaneous electrical nerve stimulation).

Outcomes

Reduction of bruxism events

The number of bruxism events must be measured by electromyography and expressed as the number of rhythmic

masticatory muscle activity (RMMA) episodes (N) and/or the duration of the RMMA episode.

Changes in pain intensity

The pain must be measured using a visual analogue scale (VAS)—0–10, 0 no pain, 10 maximum pain—or another objective validated instrument. If more than one scale is used, VAS results will be the priority.

Secondary

Change in functional movement

Range of motion and changes in function (jaw movements) are as follows: assessed by objective measures (measured using a ruler or a calliper, expressing the range of motion in millimetres or centimetres) for the following movements: maximum mouth opening (passive and active), lateral movement (left and right) and protrusive movement.

Maximum bite force reduction

The maximum occlusal force (kg) and the maximum bite force (kg) are measured by objective measures or validated tests.

Information sources and search strategy

With the assistance of an experienced health sciences librarian, search strategies were developed (online supplemental appendix 2). The search will be applied to seven databases (Cochrane Library, Embase, LILACS, Livivo, PubMed/MEDLINE, Scopus and Web of Science). Additionally, a search for grey literature will be conducted on Google Scholar and ProQuest Dissertation and Theses Global. Hand searches of bibliographies from included studies and key journals will be conducted, and experts will be consulted to identify additional relevant studies.

DATA MANAGEMENT

The search will be carried out, and its results will be imported into a reference software manager (EndNote X9; Thomson Reuters, Philadelphia, PA, USA),[46] where the duplicates will be removed. Then, one unique file will be exported to Rayyan Online Software (Qatar Computing Research Institute, Qatar)[47] for screening.

Selection process

The study selection process will involve two independent reviewers (MSC and JMDdO) and will be conducted in two phases. During the initial phase, the identified SRs will undergo an initial screening process based on their titles and abstracts. In the second phase, SRs that passed the initial screening stage will undergo a full-text assessment. If any disagreements arise, the involvement of the third reviewer (HP) will be sought to reach a final decision.

Data collection process

One independent reviewer (MSC) will collect data from the selected articles. Subsequently, a second reviewer will cross-check the retrieved information (JMDdO). In the event of any disagreement, the reviewers will discuss and resolve it. When essential data for the review are absent or unclear, attempts will be made to contact the study's corresponding author to resolve or clarify the issue. If there is no response after three contact attempts within 3 weeks, the data will be recorded as 'data missing or unclear'.

Data items

The following variables will be extracted:

- Study characteristics (author, country and year)
- Objectives
- Participants characteristics (number, age, description of the condition (bruxism) and criteria of bruxism diagnosis)
- Intervention and comparison (site, drug and follow-up)
- Results for each outcome;
- Conclusions
- Funding
- Conflict of interest
- Protocol registry
- Searched databases
- Additional literature search
- Number of randomised controlled trials (RCTs) and/or non-RCTs included
- Risk of bias assessment tools
- Meta-analysis development
- Use of the Grading of Recommendations Assessment and Evaluation approach;
- Compatibility with a Cochrane review
- Publication bias

Risk of bias assessment

The methodological quality of the included systematic reviews will be assessed through AMSTAR-II.[48]

SYNTHESIS METHODS

A narrative synthesis will be employed as the formal method to combine individual SR data. The results will be illustrated using tables, colour charts and figures. When reviewing the results of included SRs, data from duplicated primary studies may be analysed repeatedly.[49 50] To mitigate this, the overlap among SR will be quantified using the corrected covered area and illustrated through the Graphical Representation of Overlap for Overviews.[49]

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Contributors This protocol was carefully produced, concluded, reviewed and approved with the communion of all authors. MSC worked on study conceptualisation, study design, data collection, data analysis and the initial manuscript draft and approved the final manuscript as submitted. JMDdO worked on study conceptualisation, study design and data collection and approved the final manuscript as submitted. HP worked on study conceptualisation, study

design and data collection and approved the final manuscript as submitted. PP worked on study conceptualisation, study design, data collection and data analysis and approved the final manuscript as submitted. CMS worked on study conceptualisation, study design and data collection and approved the final manuscript as submitted. LCDLM worked on study conceptualisation, study design, data analysis and the manuscript critical revision and approved the final manuscript as submitted. GDLC worked on study conceptualisation, data analysis and the critical manuscript revision and approved the final manuscript as submitted. Guarantor: GDLC.

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