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Use of botulinum toxin type A in the treatment of chronic migraine symptoms — A narrative review

Uso da toxina botulínica tipo A no tratamento dos sintomas da enxaqueca crônica — Uma revisão narrativa

Uso de la toxina botulínica tipo A en el tratamiento de los síntomas de la migraña crónica — Una revisión narrativa

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Abstract: A high frequency of migraine attacks can negatively impact an individual's daily routine, affecting both their performance in everyday activities and their physical and emotional well-being—symptoms that may be alleviated through the administration of botulinum toxin. This study aims to analyze the use of botulinum toxin type A for the preventive treatment of this condition, based on a descriptive, qualitative literature review conducted using the Google Scholar and SciELO databases. The studies analyzed largely demonstrated favorable results, primarily in terms of a reduction in the number of days with pain. However, variations in response and potential adverse effects—generally mild to moderate in nature—were also observed. It has been established that botulinum toxin type A represents a significant preventive alternative for chronic migraine, though it requires individualized patient monitoring, and further research into its efficacy and safety is warranted.

Keywords: Chronic migraine; Botulinum toxin type A; Preventive treatment; Therapeutic efficacy.

Resumo: A frequência elevada de crises de enxaqueca pode gerar impactos negativos na rotina dos indivíduos, podendo afetar tanto o desempenho em atividades cotidianas quanto o bem-estar físico e emocional, sintomas que podem ser amenizados com a aplicação da toxina botulínica. Este trabalho tem como objetivo analisar o uso da toxina botulínica tipo A no tratamento preventivo dessa condição, por meio de uma revisão bibliográfica descritiva e qualitativa, realizada nas bases Google Acadêmico e SciELO. Os estudos analisados demonstraram, de forma majoritária, resultados favoráveis, principalmente na redução dos dias de dor. Porém, foram observadas variações de resposta e possíveis efeitos adversos, geralmente leves ou moderados. Estabeleceu-se que a toxina botulínica tipo A apresenta uma alternativa preventiva relevante para a enxaqueca crônica, sendo necessários acompanhamento individualizado e novos estudos sobre sua eficácia e segurança.

Palavras-chave: Enxaqueca crônica; Toxina botulínica tipo A; Tratamento preventivo; Eficácia terapêutica.

Resumen: La elevada frecuencia de las crisis de migraña puede generar efectos negativos en la rutina de las personas, afectando tanto su desempeño en las actividades cotidianas como su bienestar físico y emocional, síntomas que pueden aliviarse con la aplicación de toxina botulínica. Este trabajo tiene como objetivo analizar el uso de la toxina botulínica tipo A en el tratamiento preventivo de esta condición, mediante una revisión bibliográfica descriptiva y

cualitativa realizada en las bases Google Académico y SciELO. Los estudios analizados demostraron, en su mayoría, resultados favorables, principalmente en la reducción de los días con dolor. Sin embargo, se observaron variaciones en la respuesta y posibles efectos adversos, generalmente leves o moderados. Se estableció que la toxina botulínica tipo A constituye una alternativa preventiva relevante para la migraña crónica, siendo necesarios un seguimiento individualizado y nuevos estudios sobre su eficacia y seguridad.

Palabras clave: Migraña crónica; Toxina botulínica tipo A; Tratamiento preventivo; Eficacia terapéutica.

1. Introduction

Migraine is a neurological disease characterized by recurrent headache attacks, which may be accompanied by nausea, vomiting, photophobia, and phonophobia. When it occurs on 15 or more days per month for more than three months, the condition is classified as chronic migraine. This condition can impair quality of life, everyday activities, and functional capacity (HEADACHE CLASSIFICATION COMMITTEE, 2018). Preventing chronic migraine is challenging because oral medications may be limited by a lack of efficacy or poor tolerability (BLUMENFELD, 2023). The choice of preventive treatment must consider efficacy, safety, and tolerability. In this context, botulinum toxin type A has emerged as a preventive therapeutic alternative for patients with chronic migraine. Its efficacy was investigated in clinical studies such as the PREEMPT program, which assessed toxin administration compared with placebo; analysis of the results showed a significant reduction in the frequency of headache days (DODICK, 2010). Although botulinum toxin type A is known for its neuromuscular action, its effect in migraine prevention involves mechanisms related to pain transmission. The substance acts on proteins involved in the release of neurotransmitters and other mediators and may reduce peripheral nociceptive signaling and the activation of pain-related pathways. Thus, its therapeutic action extends beyond muscle relaxation and is also related to the modulation of sensory mechanisms involved in chronic migraine (BURSTEIN, 2020). Despite favorable results, attention to its safety profile and potential adverse effects is necessary. The most commonly reported adverse effects were neck pain and muscle weakness, mostly mild or moderate in intensity (DODICK, 2010). An analysis of the efficacy, mechanism of action, and safety of botulinum toxin type A is therefore important for understanding its contribution to the preventive treatment of chronic migraine.

General objective: To evaluate and interpret, through a literature review, the use of botulinum toxin type A in the treatment of migraine symptoms.

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Specific objectives:

- Describe the molecular structure, mechanism of action, and main therapeutic and aesthetic applications of botulinum toxin type A;
- Characterize migraine in terms of its pathophysiology and the main treatments currently available;
- Study the therapeutic use of the toxin in migraine, considering indications, mechanism of action, administration, and clinical outcomes;
- Identify the main adverse effects and complications associated with botulinum toxin type A treatment.

2. Theoretical framework — Results

2.1 Botulinum toxin

Molecular structure

Botulinum toxin is a protein produced by the bacterium Clostridium botulinum. The toxin interferes with the transmission of nerve signals to muscles and may cause the generalized muscle paralysis characteristic of botulism; it is among the most potent toxins currently known (FREITAS, 2021). The bacterium can produce seven different serotypes (A, B, C, D, E, F, and G). These serotypes have mechanisms of action related to the cleavage of proteins involved in neurotransmitter release. Botulinum toxin type A acts primarily on the SNAP-25 protein, impairing the fusion of synaptic vesicles with the cell membrane and inhibiting acetylcholine release. Consequently, muscle activity is reduced, leading to relaxation (MONASH, 2025).

It consists of two protein chains: a heavy chain responsible for binding the toxin to presynaptic cholinergic terminals and a light chain responsible for its toxic activity. These two chains are linked by a disulfide bond (ARAUJO, 2017). The toxin binds to nerve endings through its heavy chain, while the light chain enters the neuron and cleaves SNARE proteins, preventing acetylcholine release and blocking neuromuscular transmission. The duration of its effects depends on resistance to degradation, with botulinum toxin type A being more resistant and longer acting (MARTINS; CHAVES; LORENCETE, 2025).

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Dispersion and unit of measurement

Botulinum toxin is marketed in vials containing 100 units (U) of lyophilized powder and must be reconstituted. Sterile, preservative-free 0.9% saline is recommended because unsuitable diluents may compromise product stability and increase discomfort during injection (SPOSITO, 2004). Dilution requires care to avoid excessive agitation and bubble formation, which may compromise its structure and activity. The diluent volume varies according to the product and desired concentration (MOSCONI; OLIVEIRA, 2018). Botulinum toxin generally begins to act three to five days after administration and may last approximately six months. Its effect begins to decline gradually from the third month onward (ROCHA, 2023).

Therapeutic and aesthetic applications

In aesthetics, botulinum toxin type A is widely used in cosmetic procedures to soften wrinkles and expression lines by temporarily reducing muscle contraction (REIS et al., 2020). In the treatment of strabismus, botulinum toxin type A temporarily reduces extraocular muscle contraction, promoting ocular alignment. Although it is a less invasive alternative to surgery, its results may be less stable in certain situations (XAVIER; ANDRADE; LOBO, 2021; NOGUEIRA et al., 2022). Botulinum toxin type A may help control bruxism by temporarily reducing the contraction force of the masticatory muscles, contributing to a reduction in pain and excessive muscle activity (MACHADO; SOUSA; SALLES, 2020; MERAL; TÜZ; BAŞLARLI, 2021). In hyperhidrosis, characterized by excessive sweat production, botulinum toxin temporarily blocks acetylcholine release at the nerve endings that stimulate sweat glands, reducing sweating and the discomfort associated with the condition (HAGEMANN; SINIGAGLIA, 2019). Hidradenitis suppurativa is a chronic inflammatory skin disease; the use of botulinum toxin in this condition may be related to reduced local sweating, although its mechanism of action has not yet been fully elucidated (GEOGHEGAN et al., 2022).

2.2 Migraine

Migraine pathology

Migraine is a neurological disease characterized by recurrent headache attacks, frequently accompanied by nausea, vomiting, photophobia, and phonophobia. Its pathophysiology involves changes in brain activity and activation of the trigeminovascular

system, which is responsible for pain transmission. Cortical spreading depression, characterized by a wave of neuronal depolarization, is associated with aura, while the release of neuropeptides, especially CGRP, contributes to sensitization of pain pathways (NOSEDA; BURSTEIN, 2013).

Attacks may include premonitory, aura, headache, and postdrome phases, with manifestations such as fatigue, sleep changes, visual and sensory disturbances, and difficulty concentrating (DODICK, 2018). Possible triggers include stress, fasting, sleep changes, sensory stimuli, and certain foods and beverages, whose influence varies among individuals (HINDIYEH et al., 2020).

Migraine is more common in women, especially during their reproductive years, and estrogen fluctuations may promote attacks during menstruation, while pregnancy, the postpartum period, and menopause may modify their frequency and intensity (MACGREGOR, 2015).

Another clinical form is familial hemiplegic migraine, a rare subtype characterized by reversible motor weakness during aura and associated with genetic changes in the CACNA1A, ATP1A2, and SCN1A genes (JEN, 2024).

Recognizing clinical manifestations and associated factors contributes to differential diagnosis and appropriate disease management.

Available treatments

Migraine treatment is divided into acute treatment, intended to relieve attacks, and preventive treatment, indicated when episodes are frequent or impair quality of life. Analgesics and anti-inflammatory drugs, such as paracetamol, ibuprofen, and naproxen, may be used for attacks. In more severe cases, triptans such as sumatriptan and rizatriptan are specific options. Antiemetics such as metoclopramide help control nausea and vomiting. Gepants such as ubrogepant and rimegepant are also used for acute treatment, whereas ergot derivatives have more restricted use because of their risks and contraindications. The choice depends on attack intensity, clinical conditions, and the individual response to treatment (AILANI et al., 2021).

Preventive treatment aims to reduce the frequency, intensity, and impact of attacks. Traditional medications include topiramate, propranolol, metoprolol, amitriptyline, and candesartan. CGRP-targeted therapies are also available, including the monoclonal antibodies erenumab, fremanezumab, galcanezumab, and eptinezumab, as well as the gepants atogepant and rimegepant. Botulinum toxin type A may also be indicated for patients with chronic

migraine. Treatment selection must consider patient characteristics, contraindications, adverse effects, and the response to previous therapies (CHARLES et al., 2024; AILANI et al., 2021).

In addition to medication, nonpharmacological measures may contribute to disease control, such as maintaining regular sleep and meal schedules, ensuring adequate hydration, engaging in physical activity, and identifying potential triggers. Relaxation techniques and cognitive behavioral therapy may also help prevent and cope with attacks (PROBYN et al., 2017; TREADWELL et al., 2025).

Among preventive options, botulinum toxin type A stands out, particularly for chronic migraine, in which it may contribute to reduced attack frequency and improved quality of life (FERREIRA, 2023).

2.3 Therapeutic use of botulinum toxin for migraine

Main indications

Botulinum toxin is used in migraine treatment and prevention, helping reduce attack frequency and intensity and improve patient quality of life. It is primarily indicated for patients who do not respond adequately to oral medications, experience adverse effects, or have contraindications to their use (SANTOS, 2023). Unlike conventional treatments, botulinum toxin has effects lasting for months, helping reduce and control migraine attacks (ARAUJO, 2017).

Mechanisms of action in the body

Botulinum toxin type A acts in chronic migraine prevention through mechanisms extending beyond muscle relaxation by interfering with peripheral pain transmission. It acts at sensory nerve endings, reducing the release of neurotransmitters and neuropeptides such as calcitonin gene-related peptide (CGRP), substance P, and glutamate. These substances participate in the activation and sensitization of nociceptive pathways, especially the trigeminovascular system involved in migraine pathophysiology (BURSTEIN, 2020; DURHAM; CADY, 2011).

The toxin's molecular mechanism involves cleavage of SNAP-25, a component of the SNARE complex responsible for substance release by nerve cells. This interference decreases the release of mediators involved in pain transmission and may reduce peripheral sensitization associated with attacks (BURSTEIN, 2020).

Clinical trials have demonstrated fewer headache days and improvement in the disease's impact on quality of life, while follow-up studies have observed sustained benefits with repeated treatment cycles. Botulinum toxin is therefore a preventive option for patients with chronic migraine, according to medical assessment and indication (BLUMENFELD, 2010; DODICK, 2010; AURORA, 2011).

Methods of administration

The PREEMPT studies helped establish a botulinum toxin injection protocol with proven efficacy in chronic migraine treatment. This protocol initially recommends 31 injections of 5 units per site, distributed across specific head and neck regions, including the glabellar, frontal, temporal, occipital, and upper cervical areas and the trapezius muscle. In addition to the fixed injections, up to eight additional injections may be administered according to the location of the patient's headache or most tender points.

The total amount of toxin used may therefore range from 155 units when only the fixed sites are considered to 195 units when all additional injections are performed. Injection technique is also highly important for treatment safety (BLUMENFELD, 2010).

Duration of effect and outcomes

The PREEMPT program studies demonstrated that botulinum toxin type A reduces the frequency of headache days in patients with chronic migraine, with benefits potentially appearing during the first treatment cycle. However, therapeutic response varies among individuals, and some patients may require subsequent injections to achieve satisfactory results (SILBERSTEIN, 2015).

In addition to reducing headache frequency, treatment may lessen migraine's impact on daily activities and improve quality of life. Studies demonstrated sustained clinical benefits during follow-up lasting up to 12 months (LIPTON, 2016).

Under the PREEMPT protocol, injections are generally administered at 12-week intervals. However, some patients experience a decrease in therapeutic effect before the next session, a phenomenon termed wearing-off, characterized by symptom recurrence or worsening. In a Portuguese study involving 60 patients, 66.7% reported a diminished effect before the next injection, mainly between weeks 10 and 12 (FERNANDES, 2023).

Similar results were observed by Kocaman et al. (2021), who identified a reduction in headache frequency during the first month after injection, followed by an increase in days with pain during the third month.

Thus, therapeutic response assessment must consider headache frequency and intensity, duration of benefits, and disease impact on daily activities and quality of life. This individualized monitoring makes it possible to assess clinical progress and support decisions regarding treatment continuation.

2.4 Adverse effects and complications

Common, serious, and rare effects

Adverse effects are generally mild or moderate and include neck pain, muscle weakness, and eyelid ptosis (DODICK, 2010). However, repeated toxin use may reduce treatment efficacy because of antibody formation (ZANETTI MEDRANO, 2025). In extreme cases, it may impair the respiratory muscles, causing respiratory failure and potentially even patient death (CORASANITI et al., 2023; ANVISA, 2025). Another rare complication is dysphagia, which may cause choking and aspiration pneumonia, as well as severe allergic reactions and a drop in the patient's blood pressure. Although recognized as potential risks, their frequency in migraine treatment has not yet been well established (DIENER, 2014; ANVISA, 2025).

Muscular complications

The main muscular complications include temporary muscle weakness, especially in the neck and shoulder regions, as well as localized motor changes. Eyelid ptosis may also occur when the toxin affects muscles near the injection site. The frequency of these manifestations varies according to individual response and treatment characteristics (DODICK, 2010).

Preventing these complications depends on anatomical knowledge, correct administration, and adherence to the recommended therapeutic protocol. Patient follow-up is also important for identifying possible adverse effects and guiding appropriate management.

Although generally transient, manifestations such as marked weakness or difficulty swallowing and breathing require immediate medical evaluation. Thus, the use of botulinum toxin type A in chronic migraine requires appropriate technique and clinical monitoring to minimize risks and promote treatment safety (BENDTSEN, 2018).

3. Materials and methods

This study presents a descriptive literature review with a qualitative approach, aiming to analyze the use of botulinum toxin type A in the treatment of chronic migraine symptoms to improve the quality of life of those affected by the condition. Scientific material was searched through Google Scholar and SciELO. The following Portuguese descriptors were considered: “toxina botulínica tipo A” [botulinum toxin type A], “enxaqueca crônica” [chronic migraine], and “mecanismo de ação da toxina botulínica” [mechanism of action of botulinum toxin]; the English descriptors were “botulinum toxin type A” and “chronic migraine”. The terms were used in different combinations to broaden and focus the search for relevant studies. More recent publications were prioritized for inclusion without disregarding classic studies relevant to understanding the topic. Following selection, reading, and analysis, the results were organized according to the main aspects identified, allowing discussion of the use of this therapeutic approach to reduce migraine attack frequency and intensity.

4. Results and discussion

Chronic migraine is a neurological condition characterized by a high frequency of migraine episodes, which can significantly affect individual quality of life. In this setting, botulinum toxin type A has shown promising therapeutic responses in patients who do not respond effectively to conventional pharmacological treatments. Available scientific evidence demonstrates satisfactory results in reducing migraine days and also shows a significant improvement in patient quality of life, although efficacy may vary among patients.

According to Mello and Jacociunas (2023), in a review bringing together 21 studies, including six meta-analyses and 15 clinical trials, botulinum toxin type A showed positive results in chronic migraine prevention. The authors identified a significant reduction in symptoms with a safety profile considered acceptable, with mild or moderate adverse effects. However, the diversity of studies analyzed, including different doses, populations, and parameters, highlights the importance of interpreting the results in light of each study's methodological features. Nevertheless, the findings support the toxin's use as a relevant preventive alternative for patients.

The therapeutic effects of botulinum toxin type A are related to its action on neuromuscular transmission and modulation of the mechanisms involved in pain signaling. The toxin cleaves SNAP-25, a component of the molecular complex responsible for releasing

vesicles containing neurotransmitters. Although its peripheral action on acetylcholine release is well established, the benefits observed in migraine do not arise exclusively from muscle relaxation. Modulation of the release of nociceptive mediators, including calcitonin gene-related peptide (CGRP), and reduced sensitization of structures involved in pain transmission are mechanisms proposed to explain part of its preventive effect.

Thus, botulinum toxin's action in migraine should be examined from a neurobiological perspective, considering the contribution of peripheral mechanisms to ongoing pain signaling. This understanding distinguishes the toxin's therapeutic use in chronic migraine treatment from its aesthetic applications because the clinical objectives and substance administration protocols differ. For biomedical science, knowledge of these mechanisms is highly relevant to understanding the relationship between molecular action and outcomes observed in clinical studies.

The most consistent findings on the efficacy of botulinum toxin type A came from the PREEMPT clinical program (Phase III Research Evaluating Migraine Prophylaxis Therapy), comprising two randomized, double-blind, placebo-controlled phase III clinical trials. In the pooled analysis of these studies, Aurora et al. (2011) evaluated toxin use in adults with chronic migraine. The results demonstrated a satisfactory reduction in migraine days in the treatment group compared with the placebo group. In extended assessment, the benefits were maintained among participants who continued treatment.

These results are relevant because randomized clinical trials allow intervention effects to be compared with those in a control group, contributing to evidence of therapeutic efficacy. However, the difference between groups, although statistically significant, does not mean that all patients show the same degree of response. Individual assessment must consider baseline attack frequency, pain intensity, functional impairment, and the response obtained over treatment cycles.

The clinical efficacy of botulinum toxin type A was also demonstrated by Aurora et al. (2010) in a pooled analysis of the double-blind phases of the PREEMPT studies. The authors observed improvement in different symptom-related parameters, as well as benefits regarding disease-related disability and quality of life. Adverse effects were more frequent in the toxin-treated group than in the placebo group, although most were mild or moderate. Few participants discontinued treatment because of these events, and no alarming safety signals were identified.

Analysis of these findings showed that effectiveness assessment should extend beyond reduced frequency. Improved functional capacity, reduced attack impact on daily activities, and less disability are also important indicators of clinical response. Thus, the toxin may offer

benefits beyond a decrease in the number of pain days, contributing to improved patient well-being.

Another relevant perspective concerns the maintenance of therapeutic effects over time. Silberstein et al. (2024), analyzing pooled PREEMPT program results, investigated the persistence of botulinum toxin type A benefits during follow-up lasting up to 56 weeks. The results indicated that some treated patients achieved a reduction in monthly migraine frequency sufficient to no longer meet the condition's frequency criterion during certain follow-up periods. These findings further support the possibility of sustained benefits with continued treatment.

However, interpreting long-term findings requires care and attention because continued follow-up and injections may directly influence efficacy. Moreover, reducing migraine frequency to fewer than 15 days per month does not necessarily mean an absence of attacks or a cure. Therapeutic response should therefore be assessed continuously, considering records of symptom relapse, clinical progress, and patient-reported functional impact.

Quality of life is also an important outcome in preventive therapy assessment. Lipton et al. (2016), using PREEMPT program data, observed improved health-related quality-of-life indicators and reduced migraine impact during follow-up. Results obtained with specific instruments, such as the Headache Impact Test (HIT-6) and the Migraine-Specific Quality of Life Questionnaire (MSQ), indicated treatment-related benefits.

From this perspective, botulinum toxin type A may be considered a relevant preventive strategy for patients whose condition significantly affects professional, academic, social, and personal activities. However, the magnitude of benefits must be interpreted individually because clinical response may vary and not all patients experience sufficient improvement to justify treatment continuation.

Regarding safety, PREEMPT program studies demonstrated that botulinum toxin type A has a tolerability profile considered acceptable in the treatment of chronic migraine symptoms. Patient-reported adverse effects include injection-site pain, neck pain, muscle stiffness, and eyelid ptosis. Although generally transient, these effects must be considered when assessing the risk–benefit balance; adverse effects must be taken into account even though they are mild or moderate in most cases.

It is important to distinguish the tolerability observed in clinical trials from conditions encountered in clinical practice. Controlled study results are essential for establishing efficacy and characterizing adverse events, but clinical experience may reveal differences related to patient profiles. In this regard, the study by Mello and Jacociunas (2023) complements

PREEMPT findings by gathering evidence from different investigations and jointly highlighting efficacy and safety.

Another important issue is patient selection and the use of appropriate protocols. Clinical evidence supporting botulinum toxin type A was produced mainly in adults with chronic migraine, a condition that differs from acute migraine. The findings should therefore not be generalized to everyone with migraine. Indication must consider diagnostic criteria, treatment history, contraindications, and individual assessment by the responsible physician.

The PREEMPT program established an injection protocol using doses of 155 to 195 units, distributed across specific head and neck sites at intervals of approximately 12 weeks. Standardization helped generate comparative evidence across studies and consolidate botulinum toxin type A as a viable option for treating chronic migraine symptoms. Using evidence-based protocols is extremely important for replicating results and ensuring patient safety.

Despite positive findings, some limitations must be considered. First, treatment response is not uniform, and some patients may not respond adequately to injections. The need for periodic injections therefore entails prolonged follow-up, which may pose difficulties related to treatment access, costs, and adherence. In addition, study duration and the characteristics of investigated populations limit the generalizability of findings to all patients with chronic migraine.

Furthermore, statistically significant results do not guarantee that improvement is proportionally relevant to every individual. Effectiveness assessment must integrate clinical and functional parameters, considering patient expectations and symptom evolution during follow-up. Further studies, especially comparisons with other preventive therapies and research in different care settings, are needed to clarify which groups are most likely to benefit.

In this context, Pijpers et al. (2019) reported different findings when studying botulinum toxin type A in patients with chronic migraine and medication overuse. The authors identified no significant toxin benefit compared with placebo when both groups underwent medication withdrawal. Although studies have demonstrated benefits of the toxin for migraine prevention, results may vary according to the characteristics of the population studied. Overall analysis of the evidence therefore indicates that botulinum toxin type A is a preventive alternative supported by clinical studies for chronic migraine treatment. PREEMPT program findings, together with the systematic review by Mello and Jacociunas (2023) and long-term follow-up analyses, support its efficacy in reducing headache days and the impact of disease symptoms,

while indicating an acceptable tolerability profile. However, its use must be individualized, based on diagnostic criteria, and accompanied by periodic assessment of therapeutic response.

5. Final considerations

Analysis of the studies selected for this paper's discussion showed that 83.3% of the publications analyzed reported positive results for botulinum toxin type A in chronic migraine prevention, whereas 16.7% identified no significant benefit under the conditions investigated. Thus, favorable results predominated among the publications studied, particularly regarding reduced headache days and improved patient quality of life.

Despite positive findings, limitations were identified concerning inconsistent therapeutic response, adverse effects, and the need for maintenance injections. Moreover, the divergent findings demonstrate the importance of considering each patient's clinical characteristics and the conditions under which they were assessed; it is therefore not possible to state that everyone experienced the same results.

This study aimed to analyze information available in the scientific literature on the mechanisms of action, efficacy, and safety of botulinum toxin type A in chronic migraine prevention. The analysis systematized available knowledge on the topic and highlighted the predominance of positive study findings. However, the limited number of publications with divergent findings reinforces the need for further studies with larger samples and well-defined methods that compare the toxin approach with other preventive therapies and deepen assessment of effect duration, safety, and therapeutic response. The study thus seeks to advance scientific knowledge of the topic and provide a basis for future research.

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