DOI: https://doi.org/10.36489/saudecoletiva.2021v11i60p4714-4725

The use of botulinum toxin in the treatment of dynamic wrinkles

El uso de la toxina botulínica em el tratamento de las rugas dinámicas

O uso de toxina botulínica no tratamento de rugas dinâmicas

ABSTRACT
The purpose of this article was to analyze the efficacy of Botulinum Toxin type A in the treatment of wrinkles that is used to delay skin aging. Therefore, the study of the action of Botulinum Toxin and knowledge of the application of "Botox", a popular name, in the treatment of dynamic wrinkles are essential, in order to avoid the occurrence of possible complications in use. The method applied was a literature review, and the research was carried out by the SciELO, PubMed, Science Direct, MedLine and Bireme databases. It was possible to identify the results of scientific studies, the effectiveness of Toxin, as well as reaffirm the satisfaction of patients who use this treatment. However, it is concluded that, further studies are needed to advance this aesthetic procedure to contribute to the expansion of the Biomedical field of action and enable resources for the treatment of patients undergoing Botox.
DESCRIPTORS: Botulinum Toxin; Aging; Botox; Wrinkles.

RESUMEN
El propósito de este artículo fue analizar la eficacia de la Toxina Botulínica tipo A en el tratamiento de arrugas que se utiliza para retrasar el envejecimiento cutáneo. Por tanto, el estudio de la acción de la Toxina Botulínica y el conocimiento de la aplicación de "Botox", un nombre popular, en el tratamiento de las arrugas dinámicas son fundamentales, para evitar la aparición de posibles complicaciones en su uso. El método aplicado fue una revisión de la literatura, y la investigación fue realizada por las bases de datos SciELO, PubMed, Science Direct, MedLine y Bireme. Fue posible identificar los resultados de estudios científicos, la efectividad de la Toxina, así como reafirmar la satisfacción de los pacientes que utilizan este tratamiento. Sin embargo, se concluye que se necesitan más estudios para avanzar en este procedimiento estético para contribuir a la expansión del campo de acción Biomédico y habilitar recursos para el tratamiento de los pacientes sometidos a Botox.
DESCRIPTORES: Toxina Botulínica; Envejecimiento; Botox; Arrugas.

RESUMO
O objetivo deste artigo foi analisar a eficácia da Toxina Botulínica tipo A no tratamento de rugas. Este tratamento é utilizado visando retardar o envelhecimento da pele. Para tanto, o estudo da ação da Toxina Botulínica e conhecimento à aplicação do "Botox", nome popularmente conhecido, no tratamento de rugas dinâmicas são fundamentais, de forma a evitar a ocorrência de possíveis complicações no uso. O método aplicado foi uma revisão de literatura, sendo a pesquisa realizada pelos bancos de dados SciELO, PubMed, Science Direct, MedLine e Bireme. Foi possível identificar nos resultados dos estudos científicos, a eficácia da Toxina, bem como reafirmar a satisfação dos pacientes que utilizam este tratamento. Porém, conclui-se que, ainda é preciso novos estudos para o avanço deste procedimento estético para contribuir na ampliação do quadro de atuação do Biomédico e viabilizar recursos para o tratamento de pacientes submetidos ao Botox.
DESCRITORES: Toxina Botulínica; Envelhecimento; Botox; Rugas.

RECEIVED ON: 10/30/2020 **APPROVED ON:** 11/09/2020

Crisabete Gomes do Nascimento
Undergraduate student in Biomedicine, Estácio de Sergipe University Center, Aracaju, Brazil.
ORCID: 0000-0002-9230-3804

Marcos Garcia Valois Tavares
Undergraduate student in Biomedicine, Estácio de Sergipe University Center, Aracaju, Brazil.
ORCID: 0000-0001-9143-6632

Mylena dos Santos Nunes
Undergraduate student in Biomedicine, Estácio de Sergipe University Center, Aracaju, Brazil.
ORCID: 0000-0002-3464-044X

Lumar Lucena Alves
Medical Technologist, Gerald Champion Regional Medical Center - GCRMC, NM, USA, Graduated in Biomedicine, Tiradentes University, Aracaju, Brazil.
ORCID: 0000-0002-0375-1286

Martha Sabrina Barbosa Barreto
Undergraduate student in Physiotherapy, Estacio de Sergipe University Center, Aracaju, Brazil.
ORCID: 0000-0002-7379-8784

Ingridy Isabelle Santos
Graduated in Nursing, Graduated in Aesthetics and Cosmetics, Centro Universitário Estácio de Sergipe, Aracaju, Brazil.
ORCID: 0000-0002-7956-5164

Luana Renyelle de Oliveira Menezes
Professor at Centro Universitário Estácio de Sergipe, Graduated in Aesthetics and Cosmetics, Master in Health and Environment, Tiradentes University, Aracaju, Brazil.
ORCID: 0000-0003-0563-1875

Raphaella Ingrid Santana Oliveira
Advisor/Professor at the Estacio de Sergipe University Center, Graduated in Biomedicine, Master in Industrial Biotechnology, Tiradentes University, Aracaju, Brazil.
ORCID: 0000-0002-7027-9049

INTRODUCTION

Botulinum Toxin (BT) is a neurotoxin produced by a Gram positive anaerobic bacterium, called Clostridium botulinum. This organism has seven serological types (A-G), with type A being the most potent, specific and with a prolonged effect. [1] The use of Botulinum Toxin type A (BTA) occurs because of its rapid growth in culture and crystallization in a stable form, allowing purification effectively, thus providing longer duration of therapeutic effects. [2]

According to the International Plastic Surgery Society [3], Brazil occupies the 2nd place in the ranking of non-surgical aesthetic procedures performed in all countries, indicating, since 2018, the use of BT as the fastest growing aesthetic treatment in the world. BT, the central theme of this work, is used to treat wrinkles and, through its application, it is possible to analyze the effects in search of rejuvenation. [1]

Thus, with the notable growth in the demand for this procedure due to the aging process, natural and premature, which causes the formation of wrinkles and expression lines, it is necessary to understand its basis aiming at its indication, contraindication and prevention. Thus, with respect to the etiology, wrinkles are triggered by the loss of collagen and by the increase in muscle activities. [4] Its formation has two stages, the first of which is when it appears with movement, called a dynamic wrinkle and, when it becomes visible, without the need for facial expression, it is called a static wrinkle. [5,6] In such a way, the use of BT for the treatment of dynamic wrinkles has become a target in aesthetic procedures. 1 The treatment of BT starts when it is injected into the facial area where the respective wrinkles are located and, as a neuromuscular blocker, it will inhibit the contraction of the muscle at the site in the face of preventing the transmission of nerve impulses through neurons. [7]

Analyzing the effect of the toxin, it is possible to verify its efficiency in the temporary disappearance of dynamic wrinkles. 8 The recovery of this effect occurs by the appearance of nerve terminals and the formation of new synaptic clefts responsible for muscle contraction. [9] It is worth mentioning that its application, as it is not a surgical act, is one of the most relevant non-invasive techniques of the present times. [4] Therefore, together with the study of this treatment technique, its use becomes effective to promote self-esteem and improve the quality of life of its patients. [10]

In view of the recognition of the effect of BTA, the advantage of the non-invasive technique and the great demand for performing this procedure, it is questioned as to how the treatment helps in the rejuvenation, efficiency and safety of its application. Thus, the main objective of the work was to describe and cite the authors' contributions with an exploratory and descriptive approach. As

well as, understand the action of BTA, and highlight the area of aesthetic biomedicine for such a procedure, its progress and functionality in people's lives.

METHOD

The work was developed under an exploratory method, adopting bibliographic research as its main ally, based on analysis of books, scientific articles, theses, academic dissertations and websites that contributed to the enhancement of the respective article.

Dealing with a study of Literature Review and analysis through elaborate graphics, the methodology allowed to describe and quote the contributions of the authors regarding the studied subject. Thus, his approach was considered exploratory and descriptive; exploratory in view of the possibility of increasing knowledge about Botulinum Toxin and descriptive because it intends to accurately describe the facts and phenomena of its use in the treatment of wrinkles.

The search for scientific articles for the development of the work took place from March to April 2020. The technical procedures for the research were carried out through the SciELO, PubMed, Science Direct, MedLine and Bireme databases, using the following descriptors in Portuguese and English for the search on a national and international basis: Toxina Butolínica (Botulinum Toxin), Envelhecimento (Aging), Botox and Rugas (Wrinkles). Therefore, it was possible to make a comparison between the databases with the number of articles published in the last 5 (five) years. The analysis of the number of published articles referring to "Botulinum Toxin", a Portuguese term, by each country affiliated to the Bireme database was also subject to verification.

In the search for related articles for the discussion on the topic, texts published in the years 2015 to 2020 were chosen, being in Portuguese, Spanish and English. After the selective reading, the analytical reading was made for later interpretation of the most relevant data, organizing the subject in a logical way for the elaboration of the text. The evaluation of the data was described using graphs built in the GraphPad PRISM® program version 5.00 and a table with the following information: Authors, Title, Year, Database, Objective and Conclusion.

RESULTS

In the development of this work, a search for scientific articles was carried out to serve as an instrument of analysis on the application of Botulinum Toxin in aesthetic procedures. In the preliminary search, the descriptors "Toxina Botulínica" (BT) and "Botox" (BTX) (Figure 1) were searched in Portuguese, and they were compared with each other through various databases, using the criteria of the last five years of publication of these articles.

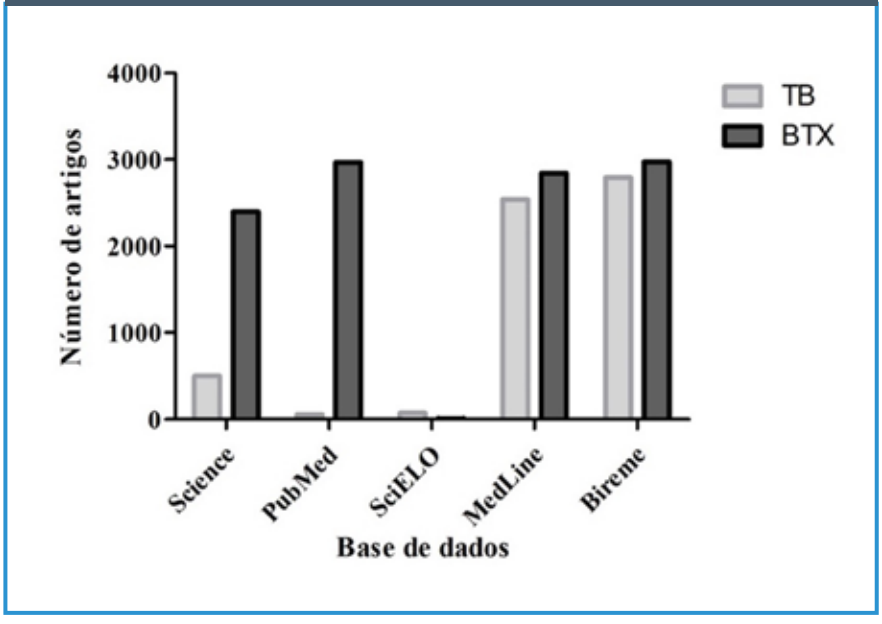
As can be seen, according to the popular name known, the descriptor "Botox" (BTX) had around 5.232 articles compared to the descriptor "Toxina Botulínica" (BT) in the databases. Suggesting that this result is due to the constant use of this term throughout the world, perhaps because it is better known in several languages and easily accessible in the search for articles.

In view of the growth of aesthetic procedures, the origins of scientific articles were observed through the quantitative criterion of articles published by countries, taking as an analysis their interests and the search for advances in the respective theme, placing Brazil in 5th place in the last 5 years, according to the Portuguese descriptor, "Toxina Botulínica" (TB), in the Bireme database (Figure 2).

DISCUSSION

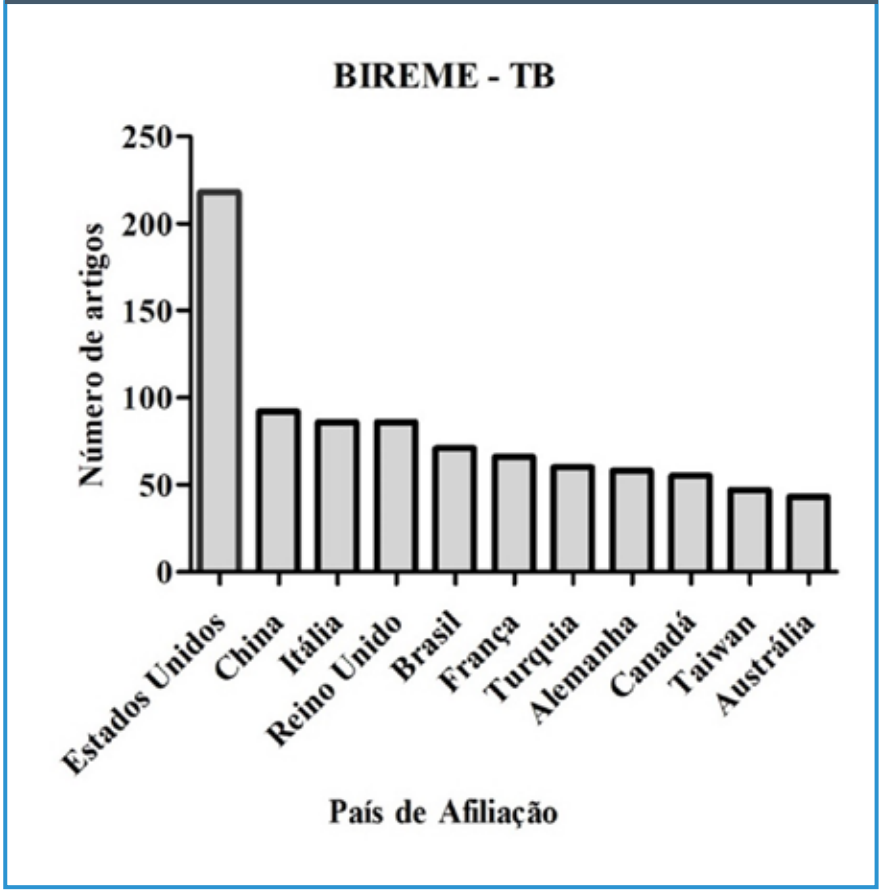
It appears that Brazil's position in the ranking for the preparation of articles on the respective theme does not follow its position as 2nd in the ranking for performing non-surgical aesthetic procedures performed in all countries, according to the International Society of Plastic Surgery. [3] Thus, these results demonstrate and suggest the need for more scientific articles and studies in the area in the Brazilian territory in order to achieve the privilege in the knowledge of this technique, as well as the advancement of aesthetic science in Brazil. According to Silva [11], aesthetic biomedicine is a branch of great daily rise where the news is constant, and with this, through study, it is possible to demystify the profession and the use of BTA, making it an aesthetic procedure better clarified in society.

Figure 1 – Search for articles with descriptors "Toxina Botulínica" (TB) and "Botox" (BTX).



Source: Authors (2020).

Figure 2 - Articles published by country of affiliation on the Bireme website with the descriptor "Toxina Botulínica" (TB).



Source: Authors (2020).

Thus, it was possible to perform analysis of articles, establishing exclusion criteria, removing publications in summary form, obtaining for this work the use of scientific articles and dissertations also with the descriptors "Envelhecimento" and "Rugas", which served as the basis for the study, with the articles included in Board 1 below:

With the descriptive analysis of the references, it was seen that the work of Gart and Gutowski [9] evaluates, in general, the use of BTA in aesthetic procedures, analyzing the appropriate places for application on the face - glabellar lines, forehead, crow's feet and perioral lip lines - and, finally, considering that each patient should be individually analyzed in terms of product selection, dosages and application locations. Ratifying the statements, França et al.[13] tell the story of BTA and its evolution over the years, which made it possible to describe each phase of the toxin, considering the benefits that were attributed to it through aesthetic procedures, thus suggesting the replacement of surgical procedures for the application of BTA in the wrinkle treatment, which is a non-invasive procedure with immediate results.

However, preliminarily, it is necessary to study skin aging, in which the article by Arango et al.[12] brought intrinsic factors - physiological factors and genetic

Chart 1. Subjects covered, dates for the dissemination of digital content and social media used for dissemination in the virtual extension activity "Healthy lifestyle: hypertension and diabetes", Trindade, Goiás, Brazil, 2020.

AUTORES	TÍTULO	ANO	BASE DE DADOS	OBJETIVO	CONCLUSÃO
GART, M.S; GUTOWSKI, K.A9	Visão geral das Toxinas Botulínicas para usos estéticos/ Overview of Botulinum Toxins for Aesthetic Uses	2016	PUBMED	Enfoca no uso estético da Toxina botulínica injetável analisando os locais mais comuns para aplicação.	A anatomia do paciente, comportamentos e os padrões de injeção podem ter impacto sobre a dosagem da Toxina Botulínica. Assim, cada paciente deve ser analisado individualmente para selecionar o produto, o tratamento da área e a dosagem apropriada.
ARANGO, A.C.M.; MUNOZ, S.V.F.; SANDAMENTE, G12	Mecanismo de envelhecimento da pele/ Mechanisms of skin aging	2017	SCIELO	Tratar do mecanismo do envelhecimento da pele de acordo com os fatores intrínsecos e extrínsecos. Analisar as novas perspectivas de prevenção e tratamento do envelhecimento da pele.	O envelhecimento da pele é um processo natural em quais diferem vários mecanismos para retardar o seu processo.

FRANÇA et al.13	A história da Toxina Botulínica: do veneno à beleza/ The history of Botulinum toxin: from poison to beauty	2017	PUBMED	Descrever sobre o avanço da Toxina Botulínica, conhecida pelo poder benéfico nos procedimentos estéticos.	A TB é uma grande descoberta para o rejuvenescimento facial, sendo um procedimento menos invasivo, mais fácil de realizar e de imediato resultado.
SATRIYASA, B.K14	Toxina botulínica (Botox) A para reduzir o aparecimento de rugas faciais: uma revisão da literatura de uso clínico e aspecto farmacológico/ Botulinium toxin (Botox) A for reducing the appearance of facial wrinkles: a literature review of clinical use and pharmacological aspect	2019	PUBMED	Analisar a questão geral do Botox como um tratamento para a redução das rugas faciais.	Botox é um bom medicamento e seguro na redução das rugas faciais. Existem várias questões relacionadas aos efeitos colaterais e complicações após injeção. No entanto, existem várias técnicas para reduzir o efeito colateral e taxa de complicações após a injeção.
BRENNAN, A; HICKEY, M.8	Toxina Botulínica na saúde da mulher: uma atualização/ Botulinium toxin in women's health: an update	2019	PUBMED	Descrever as três aplicações clínicas comuns da Toxina botulínica relevantes para a saúde da mulher.	O tratamento é eficaz, sendo necessário identificar os fatores individuais de cada paciente para que possa influenciar a eficácia e a predisposição para efeitos adversos.

predisposition - as well as extrinsic factors such as environmental factors - smoking, alcohol consumption, eating habits, ultraviolet radiation, among others - that can trigger the appearance of dynamic wrinkles, appearing through lines that form by muscle contraction. As a result, Arango et al.[12] sought the types of effective prevention for delaying skin aging, through the ingestion or application of natural products, in addition to the use of sunscreen to protect against radiation.

In order to prevent and treat skin rejuvenation, Satriyasa 14 pointed out a clinical and pharmacological analysis of BTA in the reduction of wrinkles, reaffirming the idea of Botox as the best procedure for this purpose, with minimal side effects and complications after its use. Brennan and Hicckey 8 also reported BTA as a significant agent in women's health, in addition to playing a therapeutic role in the management of overactive bladder symptoms, chronic migraine and facial wrinkles, evaluating the few studies found in the elaboration of the theme and the consequent awareness that further studies need to be done to advance treatment through BTA.

Therefore, with complementary articles, Nogueira's work 6 reinforces the use of BTA for the treatment of facial rejuvenation, as being a satisfactory resource for patients undergoing this procedure, demonstrating that more and more, through its article, the evolution becomes accentuated in the use of Botox. Together, betting on the same ideals, the article by Chaves and Paula[15] it also enriches the elaboration of the work by citing the contraindications in the use of people who are hypersensitive to some component of BTA, in application in infected places, among others, in order to ensure a good result of the procedure.

Strengthening the conception of previous works, Morais et al. [5] performed a quantitative analysis of the treatment of patients undergoing BTA in the reduction of dynamic wrinkles in an aesthetic biomedicine clinic, and responded to the constant demand for BTX, with women being the main patients of this aesthetic procedure. In this study it was also possible to see the popularity of the aesthetic procedure as it is relatively non-invasive, has few adverse effects, has little severity and is accessible when compared to other procedures. [5]

However, Yannakopolou 16 it indicates contrary effects associated with therapeutic use and cosmetic use of BTA, in which the emergence of adverse effects in therapeutic use, such as dysphagia, respiratory impairment, generalized muscle weakness and more, is more common. Also Gorgojo and Rodriguez [17] indicated the errors that should be avoided in the treatment of wrinkles with BTA so that unwanted results do not occur, such as applications with high doses or a short time between applications.

These undesirable manifestations can also occur due to the lack of post-treatment care by patients in relation to the guidelines recommended by the professional, such as avoiding physical efforts and not lowering the head. [15] Furthermore, Jia et al.18, through their meta-analysis, they detected the incidences of adverse events and complications in the treatment of facial wrinkles, such as pain, eye disorder, eyelid ptosis and heavy eyelids, but confirming the safety in the application of BTX in accordance with the technical standards for using the neurotoxin drug.

Therefore, it concludes with the reflection of Silva and Brito [17] about the importance of interdisciplinarity in aesthetics and its progress to soften the aging process, questioning the aesthetic area as

an area for the prevention of other health problems, as well as the improvement in the quality of life of patients undergoing these treatments. Silva [11] provides an overview of one of the most important areas for aesthetics in the application of BTA: esthetic biomedicine, which in turn must prepare highly qualified professionals for this procedure, following protocols, rules and indications to obtain a good result in the treatment as a whole.

Thus, through the combination of bibliographic references and its topics related to Botulinum Toxin type A in the treatment of dynamic wrinkles, it was possible to establish links that certify the effectiveness of this aesthetic procedure, according to the study of use, indications, contraindications and preventions that must be made in the application of BTA. In this way, the news and advances are constant and have made the biomedical area an instrument for realizing the wishes of patients who aspire to well-being and self-esteem through anti-aging procedures.

CONCLUSION

The article described the use of Botulinum Toxin type A as a method to treat wrinkles and achieve facial rejuvenation. Thus, it was possible to verify, through studies and reports, the effectiveness of BTA in dynamic wrinkles, resulting from repeated movements of facial muscles, according to skin aging and its relationship with the mechanism and effect of the toxin on wrinkles.

Thus, Botox is considered one of the most sought after techniques by people who aim to reach skin youth, as its minimally invasive application has rare adverse effects and little severity. It is worth mentioning the presence of a joint analysis of the aesthetic procedure, which evaluated the standards, indications and precautions that must be followed to obtain good results in the treatment.

Thus, through the elaboration of this article, the advancement of the study of Botulinum Toxin type A presents an increasing rise in the search for scientific articles according to the analyzes obtained previously by the graphs, placing the number of studies already elaborated on the respective theme. However, more in-depth studies on the application and effects of BTA in the reduction of dynamic wrinkles are necessary, together with the role of biomedicine in this area, as Brazil, as one of the main countries that perform aesthetic procedures, needs to keep up with the scientific pace focused on health. and well-being of this procedure, which has already been verified for its effectiveness. ■

REFERENCES

1. Uebel MR. Uso da toxina botulínica na prevenção de rugas dinâmicas: uma revisão de literatura. Lajeado. Monografia [Pós-graduação em Farmácia Estética] - Universidade do Vale do Taquari; 2019.

2. Correa GKAS, Pereira IEA, Costa JS, Lorraine J, Dias NM, Silva RIE, et al. Utilização da Toxina Botulínica tipo A para fins terapêuticos. Brazilian journal of surgery and clinical research 2019; 2(3):61-65.

3. International Society of Aesthetic Plastic Surgery – ISAPS [https://www.isaps.org/wp-content/uploads/2019/12/ISAPS-Global-Survey-2018-Press-Release-Portuguese.pdf]. ISAPS Global Statistics [acesso em 30 abr 2020]. Disponível em: https://www.isaps.org

4. Fujita RLR, Hurtado CCN. Aspectos relevantes do uso da Toxina Botulínica no tratamento estético e seus diversos mecanismos de ação. Revista Saber Científico 2019; 8(1):120-33.

5. Morais AM, Santos IR, Schifino LNC. Análise quantitativa do tratamento de pacientes com rugas dinâmicas faciais utilizando Toxina Botulínica tipo "A" em uma clínica de biomedicina estética em Vitória da Conquista-Bahia. Revista Educação, meio ambiente e saúde 2019; 9(4):87-103.

6. Nogueira CLC. A aplicação da Toxina Botulínica tipo A no tratamento dos sinais de envelhecimento cutâneo facial. Recife. Monografia [Especialização em Biomedicina Estética]. Instituto Nacional de Ensino Superior e Pesquisa – Centro de Capacitação Educacional; 2016.

7. Mosconi PM, Oliveira RCG. Estudo da Toxina Botulínica e sua diluição. Revista Uningá 2018; 55(3):84-95.

8. Brennan A, Hickey M. Botulinium toxin in women's health: an update. Maturitas 2019; 119:21-12.

9. Gart MS, Gutowski KA. Overview of Botulinum Toxins for Aesthetic Uses. Clinics in Plastic Surgery, 2016; 43(3):459-71.

10. Silva O, Brito JQA. O avanço da estética no processo de envelhecimento: uma revisão de literatura. Id online revista multidisciplinar e psicologia 2017; 11(35):424-40.

11. Silva ALF. Toxina botulínica na biomedicina estética: uma revisão integrativa. Rio Grande do Norte. Monografia [Graduação em biomedicina] - Faculdade de enfermagem Nova Esperança de Mossoró; 2018.

12. Arango ACM, Munoz SVF, Sandamente G. Mechanisms of skin aging. Latreia 2017; 30(2):160-70.

13. França K, Kumar AB, Fioranelli M, Lotti T, Tirant M, Roccia MG. The history of Botulinum toxin: from poison to beauty. Wiener Medizinische Wochenschrift 2017; 167:46-48.

14. Satriyasa BK. Botuliniumtoxin (Botox) A for reducing the appearance of facial wrinkles: a literature review of clinical use and pharmacological aspect. Clin Cosmet Investig Dermatol 2019; 12:223-28.

15. Chaves CTM, Paula FR. A utilização da Toxina Botulínica tipo A no rejuvenescimento. In: Anais dos 14° Simpósio de TCC e 7° Seminário de IC da Faculdade ICESP; 2018; Brasília, Brasil. p. 241-251.

16. Yiannakopoulou, E. Serious and long-term adverse events associated with the therapeutic and cosmetic use of Botulinum Toxin. Pharmacology 2015; 95:65-69.

17. Gorgojo, A. M; Rodriguez R.R. Diez errores a evitar en la inyección de Toxina Botulínica. Actas Dermo Siliograficas 2015; 106(6):458-64.

18. Jia Z, Lu H, Yang X, Jin X, Wu R, Zhao J, et al. Adverse events of botulinum toxin type A in facial rejuvenation: A systematic Review and meta-analysis. Aesthetic Plastic Surgery 2016; 40(5):769-77.