Diversitas Journal
ISSN 2525-5215
Volume 8, Número 1 (jan./mar. 2023) p. 0411 – 0420
https://diversitasjournal.com.br/diversitas_journal

The use of *Mikania glomerata* Spreng. (*Guaco*) in the treatment of respiratory allergy – an integrative review

O uso de *Mikania glomerata* Spreng. (Guaco) no tratamento de alergia respiratória - uma revisão integrativa

SOUSA, Kyanne Adrielle Gadelha[1]; NASCIMENTO, Arthur Noronha Costa do[2]; PEREIRA, José Carlos da Silveira [3]; NUNES, Luanne Eugênia[4]; ARAÚJO, Ítalo Diego Rebouças de[5]

[1] 0000-0002-3251-9881; Nova Esperança College (*Faculdade Nova Esperança*), Mossoró, RN, Brazil. Email: kyannegadelha8@gmail.com
[2] 0000-0002-5967-4873; Federal University of Rio Grande do Norte (*Universidade Federal do Rio Grande do Norte*), Natal, RN, Brazil. Email: arthurnoronha761@gmail.com
[3] 0000-0002-1813-0247; Federal Rural University of the Semiarid (*Universidade Federal Rural do Semiárido*), Mossoró, RN, Brazil. Email: carlosbiotech@gmail.com
[4] 0000-0001-6524-0994; Federal University of Pernambuco (*Universidade Federal do Pernambuco*), Recife, PE, Brazil. Email: luanneeugenia@facenemossoro.com.br
[5] 0000-0003-3990-9388; Federal University of Rio Grande do Norte (*Universidade Federal do Rio Grande do Norte*), Natal, RN, Brazil. Email: italodiego2111@gmail.com.

A B S T R A C T

The use of medicinal plants for therapeutic purposes to treat various diseases is one of the first resources used by humanity, due to the great diversity of plants with numerous therapeutic purposes. The present work intends to cover, in the form of an integrative review, the use of *Mikania glomerata*, with the objective of evaluating its potential in the treatment of respiratory allergy, in which the immune mechanism involved is mediated by antibodies of the IgE class, and the main factors that aggravate the allergic conditions are called allergens, such as house dust, pet dander, mold and pollen. As for the approach, the research was qualitative. Data collection was carried out using database platforms such as "SciELO", "PubMed" and "Biblioteca Virtual em Saúde (BVS)". The population and the sample were the works found in these databases, where the data were analyzed qualitatively. The search in the databases chosen for this work resulted in 187 articles, where after applying the exclusion and inclusion criteria, 8 articles were selected for the research, confirming the benefits of using *M. glomerata* for the treatment of allergic diseases that affect the respiratory system. Research on the side effects and cytotoxicity of herbal medicines based on *M. glomerata* are quite scarce, highlighting the need for further studies in order to assess the toxicity and side effects of the plant, making it a promising vegetable in the fight respiratory allergy.

R E S U M O

A utilização das plantas medicinais com fins terapêuticos para tratar diversas enfermidades é um dos primeiros recursos usados pela humanidade, devido à grande diversidade de vegetais com inúmeras finalidades terapêuticas. O presente trabalho pretende abranger em forma de revisão integrativa o uso da *Mikania glomerata*, tendo como objetivo avaliar o potencial desta no tratamento de alergia respiratória, a qual o mecanismo imunológico envolvido é mediado por anticorpos da classe IgE, e os principais fatores que agravam o quadro alérgico são chamados de alérgenos, como a poeira doméstica, pelos de animais, mofo e pólen. Quanto à abordagem a pesquisa foi qualitativa. O levantamento de dados foi realizado utilizando plataformas de bases de dados como SciELO, Pub Med e Biblioteca Virtual em Saúde (BVS). A população e a amostra foram os trabalhos encontrados nessas bases de dados, onde os dados foram analisados de forma qualitativa. A busca nas bases de dados escolhidas para o presente trabalho resultou em 187 artigos, onde após a aplicação dos critérios de exclusão e inclusão, 8 artigos foram selecionados para a pesquisa, podendo-se confirmar os benefícios do uso da *M. glomerata* para o tratamento de doenças alérgicas que afetam o sistema respiratório. As pesquisas sobre os efeitos colaterais e citotoxicidade de fitoterápicos à base de *M. glomerata* são bastante escassos, deixando notório a necessidade de estudos mais aprofundados com a finalidade de avaliar a toxicidade e os efeitos colaterais da planta, tornando-a um vegetal promissor no combate à alergia respiratória.

INFORMAÇÕES DO ARTIGO

Histórico do Artigo:
Submetido: 15/11/2022
Aprovado: 28/12/2022
Publicação: 10/01/2023

Keywords:
Mikania glomerata, Guaco, respiratory allergy, immunoglobulin E, herbal medicines.

***Palavras-Chave*:**
Mikania glomerata, Guaco, alergia respiratória, imunoglobulina E, fitoterapia.

DOI: 1048017/dj.v8i1.2503

Introduction

Knowledge of the practice of using medicinal plants to treat various human diseases comes from empirical knowledge passed from the oldest to the younger ones. This therapeutic resource was the first to be used by the population, because it was easy to acquire and with low cost (Valerian; Savani; Silva, 2019).

There are several existing historical records on the use of medicinal plants for various treatments since 4,000 years B.C. It is reported that one of the first medical records is deposited in the Pennsylvania Museum, dated 2,100 years B.C., containing different drugs of plant origin. The first Chinese text on the use of medicinal plants was dated 500 years B.C. and is about names, doses and indications of plants for disease treatments (Rocha et al., 2021).

The increase in the consumption of medicinal plants for therapeutic purposes is notorious. Medicinal plants have strongly contributed to the development of new therapeutic alternatives. This stems from their secondary metabolites, which can act directly or indirectly in the body. Thus, it is noted that science is unifying with nature, aiming not only for the benefit for itself, but also for the investigation of the toxic effects or interactions that plants can bring, thus reducing the indiscriminate use (Rocha et al., 2021).

In the early of 20th century, the Australian Clemens Von Pirquet created the term allergy, undergoing several modifications in its meaning over the years. However, allergy is currently interpreted as an abnormal reaction of the body after sensitization by a foreign substance called allergen (Oliviera et al., 2021). There is some confusion with the terms of respiratory allergy and atopy. The second term differs from the first because it is a genetically acquired disease that is not very specific, and is visible on the skin. It can be noted through this immunological response the increased production of immunoglobulin E (IgE) antibody in cases of atopy, while the immune response of allergy is independent to the mechanism. Thus, it can be understood that every atopic disease is considered allergic, but not every allergic disease is considered atopic. Examples of some atopic diseases can be cited for allergic asthma, allergic rhinitis and sinusitis (Oliveira et al., 2021).

Respiratory allergy is characterized as a type I hypersensitivity reaction mediated by IgE antibody, which can also be called by immediate hypersensitivity, as it is triggered a few minutes after exposure to the allergen. For this type of reaction to occur, the individual must be exposed prior to the allergen, which binds to the IgE that is linked to mast cells in tissues and basophils in the blood. This binding promotes a release of preformed mediators and the synthesis of other mediators, promoting mucus hypersecretion (Oliveira et al., 2021).

In view of the allergic condition, the plant *Mikania glomerata* of the family Asteraceae, popularly known as “Guaco”, presents secondary metabolites such as coumarin and caurenoic acid. These substances are present in large numbers in their leaves and cause

bronchodilation and relaxation of the smooth musculature, accompanied by anti-inflammatory and antiallergic actions (Melo et al., 2017).

The importance of the present study is to provide information about medicinal plants as an alternative treatment for respiratory allergy in a single work as a mobilizing factor that will serve as an educational and health care tool. Although medicinal plants are used for the purpose of treating, curing or preventing various diseases, such alternative treatment is not exempt from causing side effects. Thus, it is important to emphasize the understanding of the use of medicinal plants for the treatment of respiratory allergy, aiming at reducing indiscriminate use (Pedroso et al., 2021).

Thus, a review with the combination of existing and updated information on the theme exposed can significantly benefit society and those who seek knowledge in the area addressed. Given the above, what are the responses stimulated by *Mikania glomerata* in the treatment and relief of respiratory allergy symptoms?

The aim of this study was to evaluate the pharmacological potential of the *M. glomerata* plant in the treatment of respiratory allergy through the compilation of studies in the literature that portray this potential of the plant and that make it promising in prospecting for new substances that act in the treatment of pathologies of the respiratory system.

Methodological Procedure

To make up the study, an integrative review of the pharmacological action of *Mikania glomerata* in the treatment of respiratory allergy was performed, analyzing scientific productions that had a qualitative approach in studies similar to this.

Data collection was carried out using the main database platforms such as “SciELO”, “PubMed” and “Biblioteca Virtual em Saúde (BVS)”.

The sample refers to the articles that were selected in the databases cited for analysis, according to filters made through the descriptors, and through results described by their respective authors.

The following descriptors were used to search the articles: “*Mikania*”, “guaco”, “asthma”, “allergic rhinitis” and “antiallergic”, using Boolean operators in the data search. The descriptors were associated with the following combinations: *Mikania* OR guaco; Asthma AND allergic and antiallergic rhinitis. The time frame, to search the archives, corresponded to the period between 2010 and 2022.

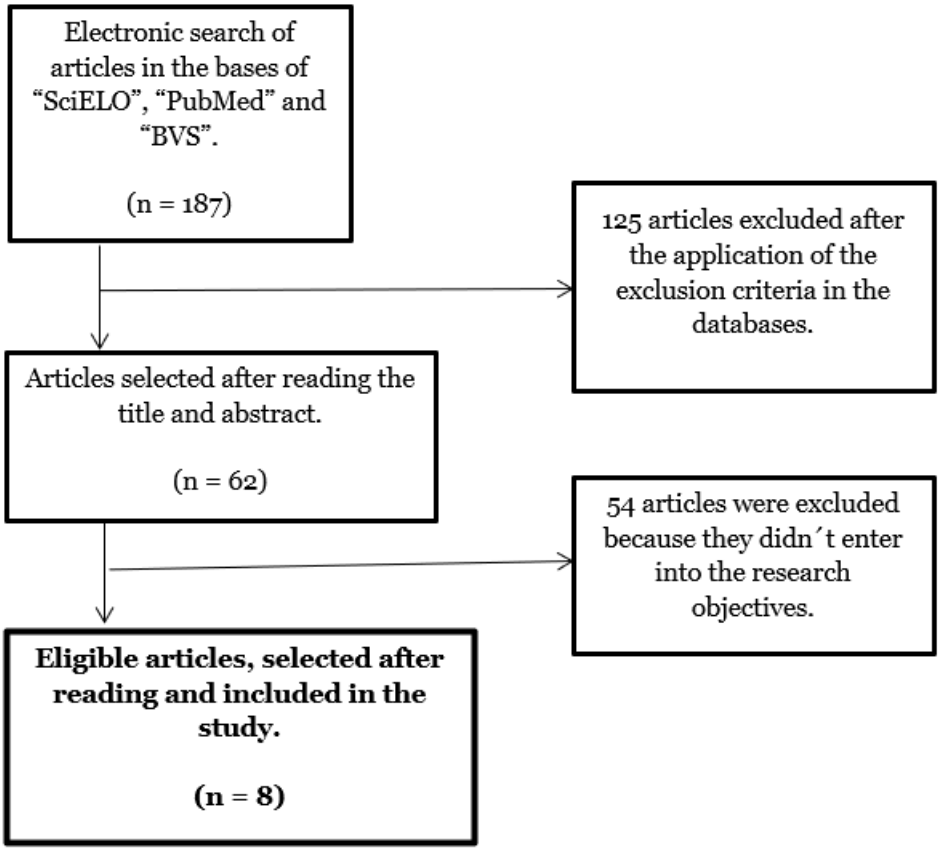
As inclusion criteria we included papers written in Portuguese and English, which presented all the descriptors related to the research theme, which could be analyzed in full, as complete articles of free access, research articles, theses and dissertations. The exclusion

criteria included books, review articles, articles that did not present the research descriptors, as well as those that were not in the cited data platforms, which were not in the Portuguese and English languages and those that were published in the lower date of 2010. Abstracts, paid access articles, duplicate papers, papers that presented incomplete texts and inconsistent methodologies were also excluded.

The data were analyzed qualitatively, aiming at an answer to the previously proposed question. After the screening of the articles that were selected, a critical analysis was made, classifying and categorizing the articles: whether the titles fit the theme of the review and whether the abstracts were pertinent to the subject addressed in the present study.

We analyzed 187 articles in the databases, where 125 were excluded through the inclusion and exclusion criteria, leaving 62 articles, which were selected for reading the title and abstract. Of these, after the critical analysis of titles and abstracts, 54 papers that did not fit the theme of the present study were excluded, totaling 8 papers that were included in the discussion. The job selection steps are presented in the following flowchart (Figure 1).

Figure 1.
Illustrative scheme showing the process of papers selection.



Source: Own authorship (2022).

Results and discussion

Of the 8 papers selected, 1 was dated 2010 (12.5%), 1 dated 2015 (12.5%), 2 were dated 2016 (25%), 1 dated 2018 (12.5%), 1 dated 2019 (12.5%) and 2 dates 2020 (25%).

After reading and evaluation, the papers were classified, alphabetically, according to the authorship, title, year, language of publication, goal and conclusion of the studies chosen for the review (Chart 1).

Chart 1.

Data collection instrument.

AUTHORS/YEAR	TITLES	GOALS	CONCLUSIONS
Bertoldi et al. (2016).	Validation of a rapid analytical method by CLAE-UV for determination of coumarin in "guaco" (*Mikania glomerata* Sprengel) confirmed with mass spectrometry.	Establish a fast analytical method to determine coumarin in "guaco" extract, contributing to the quality control of this phytotherapy through a reliable analytical method.	It has spasmolytic, anti-inflammatory and bronchodilator effect.
Fraga; Borges (2020).	Search for molecules with bronchodilator activity from the species *Mikania glomerata* Spreng using *in silico* tools.	Evaluate the main compounds that explain the bronchodilator activity of *Mikania glomerata* Spreng, using *in silico* tools.	Coumarin was the main active metabolite with possible bronchodilator activity present in *M. glomerata* Spreng.
Honório et al. (2019).	Flora of Ceará, Brazil: *Mikania* (Asteraceae: Eupatorieae).	Floristic survey of the genus *Mikania* in Ceará, northeast of Brazil.	It has bronchodilator, anti-inflammatory and antispasmodic activity, and acts in the treatment of gastric ulcers.
Matsushita et al. (2015).	Production and commercialization of "guaco" (*Mikania laevigata* Schultz Bip. ex Baker) in the Southern region of the State of Paraná.	Identify the occurrence and popular use of "guaco" in the Rio Verde watershed, characterize the production system, the flow of the product in the production chain, its costs and revenues and	It has an effect on the respiratory system, having antitussive, bronchodilator, expectorant and anti-inflammatory actions.

		analyze the marketing markup, comparing the "guaco" systems collected in the forest fragment and cultivated as semi-perennial exploitation.	
Malvezzi et al. (2020).	Popular and traditional use of *Mikania glomerata* Sprengel and *Mikania laevigata* Sch. Bip. Ex baker ("guaco") by the community that attends the reference center in integrative health practices (CERPIS) in Planaltina - DF.	Evaluate the knowledge, popular and traditional use of *Mikania glomerata* Spreng and *Mikania laevigata* Sch. Bip. Ex baker ("guaco") by the community.	The "guaco" is widely accepted by the public and has great effectiveness, mainly related to the respiratory system.
Moreno, et al. (2018).	Evaluation of antimicrobial activity and hemolytic cytotoxicity in different plant extracts.	To evaluate the antimicrobial activity and hemolytic cytotoxicity of *Arctium lappa* ("bardana"), *Equisetum arvense* ("cavalinha"), *Mikania glomerata* ("guaco"), *Morus nigra* (blackberry) and *Plantago major* ("tanchagem"), widely consumed by the population in the form of medicinal teas.	Antimicrobial action against *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*.
Pinheiro et al. (2010).	Antimicrobial effect of natural product tinctures on dental caries bacteria.	Evaluate the antibacterial activities of tinctures of *Rosmarinus officinalis* (rosemary), *Calendula officinalis* (calendula) and *Mikania glomerata* ("guaco") on dental	Bactericidal action against *Streptococcus mutans*.

		caries bacteria.	
Sguarezi et al. (2016).	Herbal medicines in the public health network (*Sistema Único de Saúde - SUS*) in Brazil: A toxicological study of *Mikania glomerata* in fetus of Wistar rats.	Evaluate the toxicity of *M. glomerata* extract during the gestational period of Wistar rats.	Large scale acceptance of the use of public "guaco" due to its great efficacy in the treatment of diseases mainly related to the respiratory system. It has anti-inflammatory and antiallergic action.

Source: Own authorship (2022).

Beneficial effects of *Mikania glomerata* Spreng in the treatment of respiratory allergy

Some species of the *Mikania* gender have great pharmacological importance and 12% of these species had their composition studied, among them, it can be highlighted the *Mikania glomerata* Spreng, widely used in traditional medicine, because it is bronchodilator, anti-inflammatory, antispasmodic, and act in the treatment of gastric ulcers (Honório et al., 2019).

It is a Brazilian plant, used for medicinal purposes, mainly in the treatment of respiratory diseases, due to its effects as a bronchodilator and expectorant. Coumarin is considered the chemical marker of "guaco", as it is an active substance and one of its main constituents, it has spasmolytic, anti-inflammatory and bronchodilator effects. The herbal medicine industries already produce medicines based on *Mikania glomera* Spreng, its presentations are in the form of extract, tincture and syrup. Due to these benefits presented by this plant species, it was included in the reference list of medicines and complementary supplies for pharmaceutical assistance in primary health care (Bertoldi et al., 2016).

Mikania glomerata is popularly known due to its therapeutic properties, standing out for its efficacy in the treatment of respiratory diseases, due to its bronchodilator and anti-inflammatory activities, thus has increased on a large scale the use of herbal medicines in the public health network that presents the plant mentioned in its constitution (Sguarezi et al., 2016).

The products composed the basis of the mentioned plant are not only of its leaves, but also of other parts such as stem and inflorescence. The "guaco" leaves have tonic, depurative and stimulating action of flu-like appetite. These properties have only been proven in scientific studies the effect on the respiratory system, having antitussive, bronchodilator, expectorant and anti-inflammatory actions (Matsushita et al., 2015).

Types of allergy combated by *Mikania glomerata*

Mikania glomerata, popularly known as “guaco”, has a strong effect of expectorant, bronchodilator and smooth muscle relaxation, proving effective in the treatment of allergic asthma and bronchitis. Its bronchodilator action and relaxation of smooth musculature are related to the blockage of calcium channels, causing bronchodilation and relaxation, as soon as allergic asthma causes airway obstruction. This effect is probably due to the action of coumarins (Fraga; Borges, 2020).

Because it has anti-inflammatory and antiallergic action it becomes effective in the treatment of rhinitis characterized by inflammation of the nasal mucosa and allergic rhinosinusitis which is inflammation of the nasal mucosa and paranasal sinus, causing it to decrease the inflation of the affected region and the effects caused by the release of histamine in the organism. “Guaco” can be used in the treatment of allergic influenza because it has anti-gri-pal, expectorant, antitussive action and stimulates appetite, fighting the signs and symptoms felt by the patient, such as loss of appetite, runny nose, which is nasal secretion, nasal obstruction and cough (Sguarezi et al., 2016).

Other benefits of *Mikania glomerata*

In addition to its therapeutic activity in the treatment of diseases of the respiratory system, Mikania glomerata has been shown to be effective in inhibiting the growth of Gram-negative bacteria. One study used the ethanol extract of *Mikania glomerata* to evaluate its antimicrobial activity and hemolytic cytotoxicity against the bacteria *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Klebsiella pneumoniae*, *Acinetobacter sp*, *Enterococcus sp* and *Salmonella sp*. In the antimicrobial evaluation, *M. glomerata* showed growth inhibition against *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* (Moreno et al., 2018).

The main etiological agent causing dental caries is *Streptococcus mutans*. One of the most widely used antimicrobials in dentistry in combating caries is chlorhexidine gluconate, due to its efficacy in removing dental biofilm. A study aimed to evaluate the bacteriostatic and bactericidal activity of some plants, including *Mikania glomerata*, comparing with chlorhexidine against dental caries bacteria. *Mikania* tincture had bactericidal action superior to other plants, because the minimum bactericidal concentration remained the same as the minimum bacteriostatic concentration (Pinheiro et al., 2010).

Conclusion

According to the results obtained by the present research, it was possible to confirm the beneficial use of *Mikania glomerata* through its notorious effects in the treatment of respiratory allergy, such as allergic asthma, allergic rhinitis or rhinosinusitis and allergic flu.

In addition to its effects to treat allergic diseases that affect the respiratory system, it was possible to notice other benefits of the studied plant, such as its antimicrobial activity against gram-negative bacteria.

Studies on the side effects of herbal medicines based on *Mikania glomerata*, or on its toxicity, are quite scarce. Finally, given the unfolding of the research, it is expected that it can stimulate future studies on the plant, addressing the biological functions attributed to it, making it a biotechnologically promising vegetable.

REFERENCES

Bertoldi, F.C., Deschamps, S.C., Silva Junior, A.A., Correa, A.F., Franco, M.F., Eberlin, M.N. (2016). Validação de um método analítico rápido por CLAE-UV para determinação de cumarina em guaco (*Mikania glomerata* Sprengel) confirmado com espectrometria de massas. *Revista Brasileira de Plantas Medicinais*, 18 (1). https://doi.org/10.1590/1983-084X/15_160.

Fraga, L.F., Borges, L.L. (2020). Busca de moléculas com atividade broncodilatadora da espécie *Mikania glomerata* Spreng empregando ferramentas *in silico*. *Revista Brasileira Militar de Ciências,* 6 (15). https://doi.org/10.36414/rbmc.v6i15.39.

Honório, A.C., Quaresma, A.S., Oliveira, C.T., Loiola, M.I.B. (2019). Flora do Ceará, Brasil: *Mikania* (Asteraceae: Eupatorieae). *Rodriguésia,* 70. https://doi.org/10.1590/2175-7860201970003.

Melo, M.C.S., Vilar. M.S.A., Confessor, M.V.A., Vilar, D.A. (14-06-2017) Plantas medicinais no tratamento de doenças respiratórias. [Pôster]. II Congresso Brasileiro de Ciências de Saúde, Campina Grande. Realize Editora http://www.editorarealize.com.br/artigo/visualizar/29524.

Malvezzi, R., Jesus, L.A.C., Dias, S.S., Silva, A.F. (2020). Uso popular e tradicional da *Mikania glomerata* Sprengel e *Mikania laevigata* Sch. Bip. Ex baker (GUACO) pela comunidade que frequenta o centro de referências em práticas integrativas em saúde (CERPIS) em Planaltina – DF. *Brazilian Journal of Development,* 6 (10) https://www.brazilianjournals.com/index.php/BRJD/article/view/18245/14736.

Matsushita, M.S., Corrêa Júnior, C., Santos, A.J., Hosokawa, R.T. (2015). Produção e comercialização do guaco (*Mikania laevigata* Schultz Bip. ex Baker) na região Sul do Estado do Paraná. *Revista Brasileira de Plantas Medicinais,* Paraná, 17 (3) https://doi.org/10.1590/1983-084X/11_154.

Melo, M.C.S., Vilar. M.S.A., Confessor, M.V.A., Vilar, D.A. (2017) Plantas medicinais no tratamento de doenças respiratórias. [Pôster]. II Congresso Brasileiro de Ciências de Saúde, Campina Grande. Realize Editora http://www.editorarealize.com.br/artigo/visualizar/29524.

Moreno, A.H., Possebon, L., Sant'ana, M., Souza, H.R., Pilon, M.M.I., Girol, A.P. (2018). Avaliação da atividade antimicrobiana e citotoxicidade hemolítica em diferentes extratos vegetais. *Research, Society and Development,* 10 (7). http://dx.doi.org/10.17696/2318-3691.25.1.2018.1172 .

Oliveira, L. S., Ferreira, B. C., Piccinin, A. (2021). Propriedades imunizantes do leite materno e seus benefícios na prevenção de doenças alérgicas. *Revista Multidisciplinar em Saúde*, *[S. l.]*, v. 2,

n. 2, p. 03, 2021. DOI: 10.51161/rems/942. https://editoraime.com.br/revistas/index.php/rems/article/view/942.

Pedroso, R.S., Andrade, G., Pires, R.H. (2021). Plantas medicinais: uma abordagem sobre o uso seguro e racional. *Physis: Revista de Saúde Coletiva* [online]. v. 31, n.2. https://doi.org/10.1590/S0103-73312021310218

Pinheiro, M.A. Brito, D.B.A., Almeida, L.F.D., Cavalcanti, Y.W., Padilha, W.W.N. (2010). Efeito antimicrobiano de tinturas de produtos naturais sobre bactérias de cáries dentárias. *Revista Brasileira em Promoção da Saúde*, 25 (2) https://www.redalyc.org/pdf/408/40823359010.pdf.

Rocha, L.P.B., Alves, J.V., Aguiar, I.F., Silva, F.H., Silva, R.L., Arruda, L.G., Nascimento, E.J., Barbosa, B.V.D., Amorim, L. C., Silva, P.M., Silva, M.V. (2021). Uso de plantas medicinais: história e relevância. *Investigação, Sociedade e Desenvolvimento*, *[S. l.]*, v. 10, n. 10, pág. e44101018282, 2021. DOI: 10.33448/rsd-v10i10.18282. https://rsdjournal.org/index.php/rsd/article/view/18282.

Sguarezi, J.G.D., Gonçalves, V.F., Rocha, T., Murakami, D.Y., Uzuelle, M.A., Moura, P.R. (2016). Fitoterápicos na rede pública de saúde (SUS) no Brasil: Um estudo toxicológico de *Mikania glomerata* em fetos de ratas Wistar. *Revista Fitos*, 10 (4) 2016 https://docs.bvsalud.org/biblioref/2018/03/880589/8.pdf.

Valeriano, F.R., Savani, F.R., Silva, M.R.V. (2019). O uso de plantas medicinais e o interesse pelo cultivo comunitário por moradores do bairro São Francisco, município de Pitangui, MG. *Interações*, 20 (3), 891-905. https://www.scielo.br/j/inter/a/DGW8BsMcxyyYnSJcD9Wb6hj/?format=pdf&lang=pt.