

The Impact Of Baccharis Dracunculifolia And Brazilian Green Propolis In Inflammatory And Oxidizing Factors: Potential Applications In COVID-19 And Immunological Diseases

AUTHOR

Abstract

Inflammation and oxidative stress play a crucial role in the development of diseases such as arthritis, lupus, and the severe effects of coronavirus disease (COVID-19). These diseases are characterized by an increase in inflammatory factors, which can be mitigated by the beneficial effects of Baccharis dracunculifolia (Bd) and Brazilian Green Propolis (BGP). To investigate the potential of Bd and BGP in reducing inflammation and oxidative stress, a comprehensive literature search was conducted using databases such as PubMed, ResearchGate, and HOLLIS Harvard Library Online Catalog. The search covered studies published from the inception of these databases until January 4, 2023. The search terms included propolis and baccharis dracunculifolia, as well as keywords related to anti-inflammatory, antioxidant, and immunomodulatory properties. The results of the studies examining the effects of Bd and BGP on inflammatory and oxidative factors have significant implications in the medical field. These findings contribute to our understanding of the existence of numerous yet unknown compounds, highlighting their potential therapeutic applications for various diseases. In conclusion, the research suggests that Bd and BGP have a significant role in reducing inflammatory and oxidative factors. These natural substances hold promise for the treatment of immunological diseases and conditions characterized by excessive inflammation, such as COVID-19.

Key-words: *baccharis dracunculifolia, anti-inflammatory, antioxidant.*

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I. Introduction

Medicinal plants currently represent the origin of 25% of the drugs used, which is due to the immense diversity of the world flora and the important therapeutic properties already marked. There are several studies carried out that contribute to the development and use of these plant species, proving therapeutic effects and enabling their use for the treatment of pathologies [1].

A food can be considered functional if it is considered that it can beneficially affect one or more target functions in the body, in addition to having nutritional effects, in a way that is both relevant for well-being and health and for risk reduction of a disease [2].

Food must have beneficial constituents in addition to the basic nutritional elements, being used in the conventional way in diets, as it has beneficial effects on regular bodily functions, helping to protect against diseases such as: diabetes, hypertension, cancer, osteoporosis and coronary artery disease [3].

Diabetes mellitus is characterized by hyperglycemia and increased neuronal or adipose tissue inflammation, which leads the body to reduce hormonal responses. Brazilian Green Propolis (BGP) is a resin produced by honey bees mixing their waxes and saliva with exudate of botanical substances. One of the characteristics of bee propolis is that it is hard and brittle when cold and soft, flexible and very sticky when hot; therefore, it is sometimes called “bee glue” [4]. Some plants of the Baccharis genus are popularly used for different purposes and some species have already been affected as a hypoglycemic activity [5].

The antioxidant activity of BGP is demonstrated in studies that have shown a reduction in oxidative stress markers [6,7]. Inflammation occurs in response to constant exposure to environmental and endogenous stimuli as well as accidental damage. Wound healing is a dynamic and complex process of skin repair that occurs in response to an injury. Inflammation represents its first stage, followed by healing and remodeling [8].

II. Methods

The type of study chosen for this research was developed by an integrative literature review related to the presumed theme. Therefore, the organization of the literature review is an attachment to the main existing knowledge bases [9].

A literature search through PubMed, ResearchGate and HOLLIS Harvard Library Online Catalog was performed from the date of inception until 01/04/2023.

After searching for the articles, the research followed the analysis stage for inclusion and exclusion of the selected materials. Firstly, the titles were analyzed, followed by the analysis of abstracts to verify which articles met the intention of studying the research. After that, the articles in total that had interconnection between the chosen keywords were analyzed. We used the keywords for the research: propolis AND anti-diabetic AND anti-inflammatory.

The analysis of the collected data was expressed in a discursive manner and illustrated utilizing tables. The table contains the title, author's name, objectives, and conclusion of each article. A figure of the knowledge design acquired by schemes was organized in a summarized way and analyzed according to the theoretical framework.

III. Results

From the searches carried out in the referred databases, 104 articles were found described according to the keywords. According to the digitized titles, ten articles were separated for reading the corresponding summary.

After reading the abstracts, zero articles were discarded because they did not have a central coherence with the theme. Ten articles were selected for a complete and coherent reading for the development of this review.

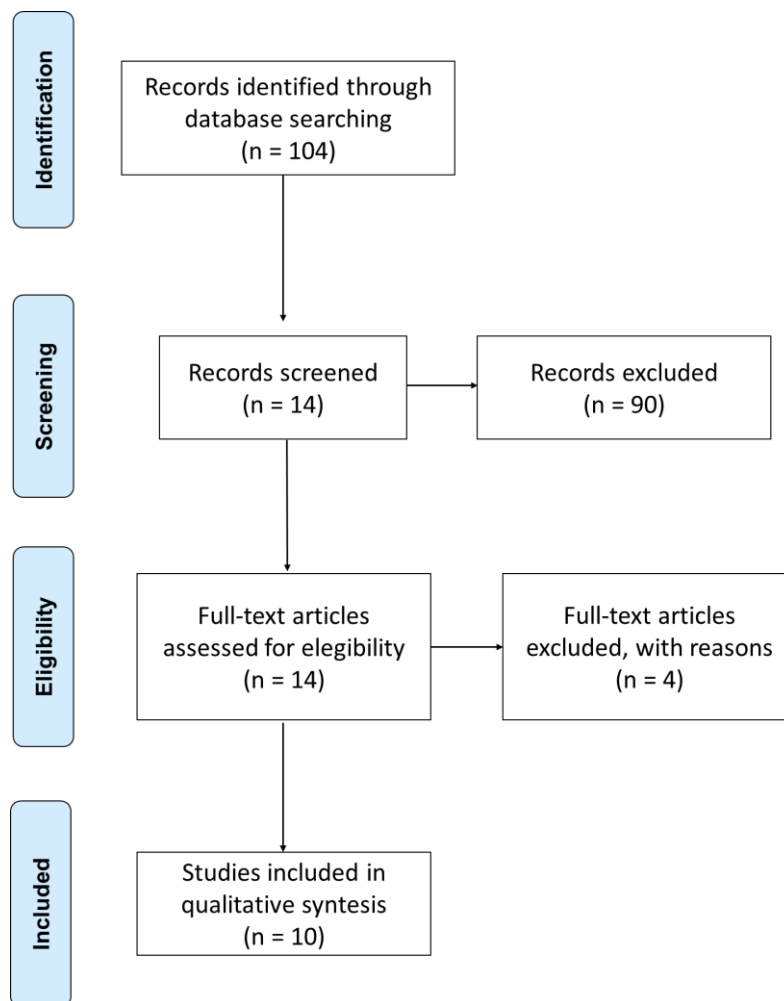


Figure 1. Flow Diagram

In the table 1 lists 10 articles in which they analyzed the exercise link in dopamine and thyroid hormones function.

Table 1. Results about Immunomodulation and anti-inflammatory effects of Bd and BGP

Author	Title	Results	Conclusion
Hocayen et al 2016 [29]	Baccharis dracunculifolia methanol extract enhances glucose-stimulated insulin secretion in pancreatic islets of monosodium glutamate induced-obesity model rats	MSG was administered to 32 newborn rats (4 mg/g of body weight) once daily for 5 consecutive days. Four experimental groups (control, control + extract, MSG, and MSG + extract) were treated for 30 consecutive days with 400 mg/kg of <i>B. dracunculifolia</i> extract by gavage.	serum insulin increased (30%);
Kitamura 2018 [13]	Brazilian propolis ethanol extract and its component kaempferol induce myeloid-derived suppressor cells from macrophages of mice in vivo and in vitro	Ethanol extract of Brazilian propolis (PEE; 100 mg/kg i.p., twice a week) was injected into lean or high fat fed obese C57BL/6 mice or C57BL/6 ob/ob mice for one month. Subsequently, immune cells in visceral adipose tissue and the peritoneal cavity were monitored using FACS analysis. Isolated macrophages and the macrophage like cell line J774.1 were treated with PEE and its constituent components, and the expression of immune suppressive myeloid markers were evaluated. Finally, we injected one of the identified compounds, kaempferol, into C57BL/6 mice and performed FACS analysis on the adipose tissue.	Intraperitoneal treatment of propolis induces myeloid-derived suppressor cells (MDSCs) in visceral adipose tissue.
Miranda 2019 [14]	Hydroalcoholic extract of Brazilian green propolis modulates inflammatory process in mice submitted to a low protein diet	subcutaneous implantation of sponge disks as an inflammatory model and the animals were distributed in the following groups: standard protein diet (12% protein content), control treatment; standard protein diet, propolis treatment; low-protein diet (3% protein content), control treatment; low-protein diet, propolis treatment. Propolis was given daily at a dose of 500 mg/kg (p.o.) during a period of 7 or 15 days.	Propolis reduced the inflammatory infiltrate (↓8%).
Guimarães 2012 [6]	Baccharis dracunculifolia, the main source of green propolis, exhibits potent antioxidant activity and prevents oxidative mitochondrial damage	Bd was prepared by fractionated percolation using propylene glycol as solvent. The total phenols and flavonoids, which are substances with recognized antioxidant action, were quantified in GEBd and the phytochemical analysis was carried out by HPLC.	DPPH radicals superoxide anions H ₂ O ₂ generation lipid hydroperoxides (LOOH).
Veiga 2017 [15]	Artepillin C and phenolic compounds responsible for antimicrobial and antioxidant activity of green propolis and Baccharis dracunculifolia DC	The amount of Artepillin C in different extracts was determined by high performance liquid chromatography analysis. Minimum inhibitory concentration 90 (MIC ₉₀) was determined using 40 isolates of <i>S. aureus</i> inoculated in Mueller–Hinton agar culture medium containing the green propolis and <i>B. dracunculifolia</i> DC extracts.	↓DPPH
Bittencourt 2015 [16]	Metabolite profiling, antioxidant and antibacterial activities of Brazilian propolis: Use of correlation and multivariate analyses to identify potential bioactive compounds	Gas chromatography–mass spectrometry was applied for chemical profiling of propolis extracts. Antibacterial activity was assessed against <i>Staphylococcus aureus</i> , <i>Bacillus subtilis</i> , and <i>Micrococcus luteus</i> . Correlation and multivariate statistical analysis were used to identify potential bioactive compounds in the extracts.	Total phenolic compounds and methyl retinoate showed a positive correlation with the antioxidant capacity

BGP treatment for inflammatory disease

Some chronic inflammatory diseases, in particular those mediated by immune complexes, are associated with intense recruitment and activation of neutrophils in tissues. Neutrophils play an important role in host defense and in regulating innate and adaptive immune responses. Once at the site of inflammation, activated neutrophils secrete a variety of pro-inflammatory cytokines, eicosanoids and chemokine and release a large amount of ROS and photolytic enzymes that can damage tissue and favor the development of pain and target organ deformity. Rheumatoid arthritis, glomerulonephritis and vasculitis are some examples of inflammatory diseases mediated by the exacerbated immune system, affecting a significant percentage of the human population and decreasing quality of life and life expectancy [21;22].

Natural products have received great attention in recent years due to the promising anti-inflammatory, immunomodulatory and antioxidant activity of extracts from plants and marine organisms and their isolated compounds. Some of the leading pharmaceutical and research institutions have shown growing interest in researching plants to discover medically useful compounds.

Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus, triggering a series of exacerbated immune responses in the body. This excess response can result in tissue damage, which is seen in the lung of the patient hospitalized with COVID-19 [23].

One study was interested in researching the potential antiviral effects of curcumin that may be useful for researchers to further investigate the potency of curcumin against the emerging new infection of SARS-CoV-2 [24]. Curcumin's ability to modulate a wide range of molecular targets makes it a suitable candidate for controlling coronavirus infection. Thus, a natural product based on curcumin, with anti-oxidant effects, becomes interesting for the treatment of inflammatory diseases.

Studies have shown immunomodulatory effects of BGP by inhibiting the activity of cyclooxygenase-2 and activating the nuclear factor κ B (NF κ B), also modulating the production of cytokines by macrophages and suppressing the effector functions of human neutrophils [9;25].

Such compounds seem to be responsible for the biological activities shared by BGP, like antioxidant, anti-carcinogenic, anti-inflammatory and immunomodulation [6;26;27].

The *Baccharis dracunculifolia*, a plant component of BGP, have antioxidant activities were studied by Hocayen et al [29], who performed extractions with different solvents (ethanol, methanol and acetone) and presented positive results in all cases, especially in methanol solvent one. The mechanism associated to hyperglycemia and diabetes is complex, but it is being related to oxidative stress and ROS [30;31].

Many compounds may be responsible for the antioxidant and anti-inflammatory activities related to *Baccharis* gender, such as: polyphenolics, among them the phenolic acids, coumarins and flavonoids [32]. Studies have been relating the production of ROS with diabetes *mellitus* observing the fact that lipid peroxidation biomarkers increase, while endogenous antioxidant syntheses decrease [33]. Thus, a way of avoiding the effects related to ROS in the organism is the treatment with compounds that possess antioxidant activities. Once damages caused by free radicals may be delayed by antioxidants, that react rapidly, even before the radicals could act in the organism [3].

Thus, it is observed that BD and BGP have a strong influence on inflammatory and oxidative factors. These effects show the link between the effects of products together with their compounds for the treatment of diseases that affect a large part of training today. In addition, a situation that can be improved is one of the most serious diseases that affect humans today, COVID-19, which has an increase in inflammatory during its development and, consequently, can be mitigated by the beneficial effects of BD and BGP. In figure 4, showed main findings on Bd and BGP on inflammatory and oxidant factors.

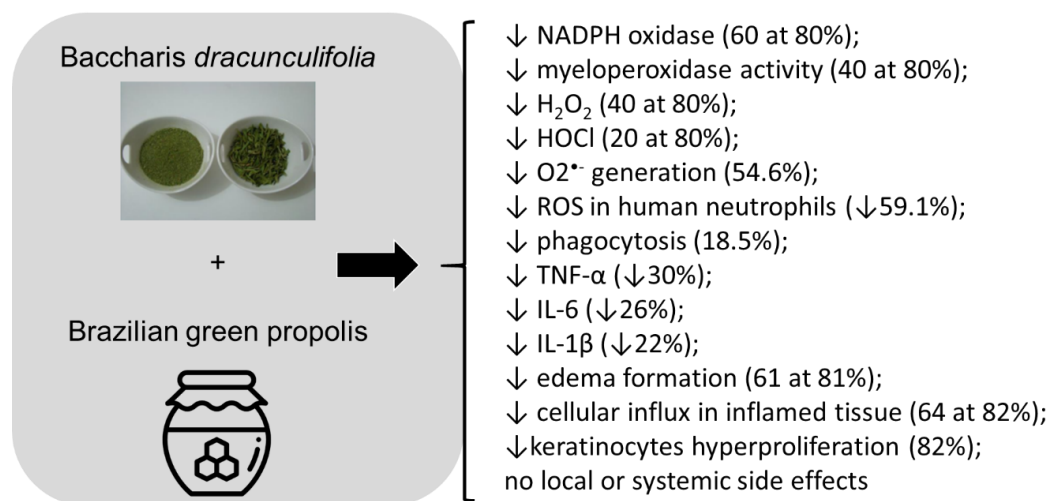


Figure 4. Main findings on Bd and BGP on inflammatory and oxidant factors

The results of inflammatory and oxidizing factors in the study are important for the medical field, in addition to understanding how there are numerous compounds that are not known yet and mainly due to their possible methods in various diseases.

IV. Conclusions

We conclude that BD and BGP are important for the reduction of inflammatory and oxidizing factors which may be beneficial to immunological diseases and exorbitant inflammatory factors as observed in COVID-19.

We understand that new ones are needed to prove the effectiveness of the treatments granted, but the treatment through BD and BGP is fundamental studies so that we can have new scientific evidence and consequently improve the treatment of various diseases that are affecting all people day after day.

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