WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 23, 1129-1136. Review Article ISSN 2277–7105

AN UPDATE ON GREVILLEA ROBUSTA POSSESS PHYTOCONSTITUENTS AND PHARMACOLOGICAL USED FOR HUMAN AND ANIMALS

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Article Received on
20 October 2024,

Revised on 09 Nov. 2024,
Accepted on 30 Nov. 2024

DOI: 10.20959/wjpr202423-34500

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ABSTRACT

Grevillea robusta, a native Australian tree that known by the name "silky oak," is being investigated more and more for its medicinal benefits. Its leaves, bark, flowers and seeds are just a few of the sections that contain a wide range of bioactive substances that are referred to as phytoconstituents. An updated assessment of the availability of research on the pharmacological characteristics, phytochemical properties, and possible uses of *G. robusta* for human and animal health is given in this review. It focus into the therapeutic effects that have been mentioned, with an emphasis on the anti-inflammatory, antibacterial, antioxidant, anticancer, and wound-healing qualities. In order to fully use the enormous medicinal potential of this extraordinary plant, the review also examines safety concerns, the shortcomings of recent research, and prospective future research directions.

KEYWORDS: Grevillea robusta, silky oak, phytochemical, medicinal plants, anti-inflammatory.

INTRODUCTION

Grevillea robusta is an evergreen tree native to eastern Australia that known by the names silky oak and silver oak. It has been widely grown for its timber and as an attractive tree in many different places. It is a medium-sized to giant tree that is frequently planted in various warm-temperate and semitropical settings as an ornamental. It belongs to the Proteaceae family of flowering plants. However, a recent assessment has emphasised *G. robusta's*

therapeutic potential because of its varied pharmacological actions and extensive phytochemical profile.[1]

In recent years, there has been a noticeable increase in the search for natural cures and environmentally friendly healthcare options. For ages, plants have been an abundant resource of therapeutic substances, and contemporary science is coming to acknowledge their effectiveness in treating a wide range of illnesses. *Grevillea robusta* is a remarkable evergreen tree that has a wide variety of phytochemicals. It shows great potential in this area.[2,3]

This review carefully looks at what is currently known about *G. robusta*, examining its pharmacological activity, phytochemical composition, and possible therapeutic uses. This effort intends to contribute to a greater knowledge of *G. robusta's* therapeutic potential and its potential to improve animal and human health by synthesising the current scientific evidence. Australian Aborigines utilised the flowers of the grevillea plant as food. The flowers were used to prepare sweet beverages or their sweet nectar to make sweet drinks.

Grevillea robusta timber was commonly used for external window woodwork due to its resistance to wood rot. It has been utilised in the production of furniture, cabinets, and fences. *Grevillea robusta* bark and leaves are used to treat headaches and dizziness in the North Garo Hills of Meghalaya in northeastern India.

Botanical Description and Distribution

Grevillea robusta, belonging to the Proteaceae family, is a fast-growing, evergreen tree native to eastern Australia. It is characterized by its distinctive fern-like foliage, bright red flowers, and robust growth habit. This tree has been widely cultivated for its ornamental value in various regions of the world, including Africa, South America, Asia, and Europe.

Fig 1: Grevillea robusta.

Phytochemical Profile

G. robusta is a treasure trove of bioactive compounds, with its various parts exhibiting a diverse phytochemical composition.[4,5]

Leaves: *G. robusta* leaves contain a variety of chemicals, including flavonoids (quercetin, kaempferol, rutin), tannins (gallotannins, ellagitannins), phenolic acids (caffeic acid, gallic acid), and volatile oils (eucalyptol, limonene).

Bark: *G. robusta* bark includes a high concentration of tannins, particularly condensed tannins, which contribute to its astringent qualities.

Flowers: Flowers are high in flavonoids and phenolic substances including kaempferol glycosides, quercetin glycosides, and myricetin glycosides.

Seeds: They include important fatty acids (linoleic and oleic acid), proteins, and a range of medicinal substances.[6]

Table 1: Chemical Constituents of Grevillea robusta.

Chemical constituents	Description / Function	Occurrence
Flavonoids	Antioxidant properties, anti-inflammatory effects	Various parts of the plant (leaves / flowers)
Tannins	Antioxidants, astringent properties; used in traditional medicine.	Bark and leaves
Saponins	Foam-forming compounds; anti microbial properties	Roots and leaves

Essential oils	Contribute to aroma and flavor; possess antimicrobial activity	Leaves
Alkaloids	Potentially bioactive; may affect neurological or digestive systems	Leaves and bark
Terpenes	Aromatic compounds; anti – inflammatory properties	Various parts of the plant
Phenolic compounds	Anti oxidative properties	Leaves and flowers
Glycosides	May have various biological activities	Found in various parts
Vitamin C	Essential nutrient; anti oxidant, boost immunity	Leaves[7]

Pharmacological Properties

The diverse phytochemical composition of *G. robusta* bestows upon it a wide range of pharmacological properties that have been studied extensively in preclinical models.[8,9]

Anti-inflammatory Activity

Numerous research have proved *G. robusta* extracts shows anti-inflammatory properties. Its flavonoids, tannins, and phenolic acids are considered to prevent the formation of inflammatory mediators such as prostaglandins and leukotrienes, resulting in reduced inflammation. This feature shows potential in treating inflammatory disorders such as arthritis, gastritis, and skin infections.[10]

Antimicrobial Activity

G. robusta extracts have high antibacterial activity against a variety of bacterial and fungal diseases. Studies have demonstrated that it is effective against both Gram-positive and Gram-negative bacteria, such as Staphylococcus aureus, Escherichia coli, and Pseudomonas aeruginosa. *G. robusta's* antibacterial qualities are due to its flavonoids, tannins, and essential oils, which damage microbial cell membranes and prevent their development.

Antioxidant Activity

G. robusta's high content of polyphenols, notably flavonoids and phenolic acids, contributes to its significant antioxidant properties. These substances scavenge free radicals and shield cells from oxidative damage, lowering the risk of chronic illnesses including cancer, heart disease and neurological disorders.

Anticancer Activity

Preliminary studies suggest that *G. robusta* extracts may possess anticancer activity. Its polyphenols have shown the ability to induce apoptosis (programmed cell death) in cancer

cells, inhibit tumor growth, and prevent metastasis. However, further research is needed to validate these findings and explore the mechanisms of its anticancer activity.

Wound-Healing Activity

Traditional healers have traditionally utilised *G. robusta* to treat wounds. Scientific research has established its wound-healing qualities, which are attributable to anti-inflammatory, antibacterial, and antioxidant actions. Extracts of *G. robusta* have been shown to improve wound closure, re-epithelialization, and collagen deposition, so expediting the healing process.

Antidiabetic

Lowers blood glucose levels.

Immunomodulatory

Enhance the immune response.

Applications in Human Health

The promising pharmacological properties of *G. robusta* have led to its exploration for various medicinal applications in human health.[11,12]

Herbal Medicines

G. robusta is a popular ingredient in traditional herbal medicines for treating a range of ailments, including inflammatory conditions, infections, and skin disorders.

Dietary Supplements

Extracts of *G. robusta* are increasingly incorporated into dietary supplements to provide antioxidant, anti-inflammatory, and immune-boosting benefits.

Nutraceuticals

G. robusta is a rich source of antioxidants and bioactive compounds holds promise for developing nutraceuticals, food-based products with health benefits.

Applications in Animal Health

The medicinal potential of *G. robusta* extends to animal health as well.[13]

Veterinary Medicines

Extracts of *G. robusta* are used in veterinary medicine to treat various animal ailments, including inflammatory conditions, infections, and parasitic infestations.

Animal Feed Additives

G. robusta extracts can be incorporated into animal feed as a natural source of antioxidants and antimicrobial agents, promoting animal health and productivity.

Safety Considerations and Limitations

While *G. robusta* holds significant potential in human and animal health, it's crucial to acknowledge safety concerns and limitations.[14,15]

Toxicity: Studies have reported potential toxicity associated with high doses of *G. robusta* extracts, particularly in certain animal models. Further research is needed to assess its long-term safety profile.

Drug Interactions: The potential for interactions with prescribed medications should be considered when using *G. robusta* extracts.

Allergic Reactions: Individuals with allergies to other plants in the Proteaceae family may experience allergic reactions to *G. robusta.*

Limited Clinical Trials: While preclinical studies support the pharmacological properties of *G. robusta*, limited clinical trials are available to confirm its efficacy and safety in humans.

Future Research Directions

To fully unlock the therapeutic potential of *G. robusta*, future research should focus on several key areas.

Detailed Phytochemical Analysis: Further investigations are needed to identify and quantify the full spectrum of bioactive compounds in *G. robusta*.

Mechanism of Action: Understanding the precise mechanisms by which *G. robusta* exerts its pharmacological effects is crucial for optimizing its therapeutic use.

Clinical Trials: Well-designed clinical trials are essential to validate the efficacy and safety of *G. robusta* extracts in human populations.

Dosage and Formulation: Establishing optimal dosages and developing safe and bioavailable formulations for *G. robusta* extracts is crucial for its practical application.

Sustainable Harvesting: Ensuring sustainable harvesting practices to minimize environmental impact is vital for long-term use of *G. robusta* resources.

CONCLUSION

The scientific data reveals that *Grevillea robusta* has a unique array of phytoconstituents with diverse pharmacological qualities, with enormous potential for use in both human and animal health. Its anti-inflammatory, antibacterial, antioxidant, anticancer, and wound-healing properties have all been well investigated and proven in preclinical models. While further study is needed to completely understand its safety profile, optimise therapeutic uses, and assure long-term use, *G. robusta* shows promise as a natural source of medicinal chemicals for a variety of illnesses. We can realise the full potential of this magnificent plant to promote human and animal health by exploiting its unique phytochemical capabilities and encouraging ethical scientific inquiry.

CONFLICT OF INTEREST

The authors have no conflicts of interest.

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