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COMPLETE STUDY OF CISSUS QUABDRAGYLARIS FOR BONE HEALING

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ABSTRACT

Cissus quadrangularis, a medicinal plant belonging to the family Vitaceae, has been used traditionally for its therapeutic properties in various cultures, particularly in Africa, India, and Southeast Asia. Known for its anti-inflammatory, analgesic, antioxidant, and antimicrobial activities, C. quadrangularis is widely employed in treating fractures, joint disorders, and bone health-related issues. It contains bioactive compounds, such as flavonoids, alkaloids, and phenolic acids, which contribute to its wide range of pharmacological effects. Studies suggest that C. quadrangularis may enhance bone healing, promote collagen synthesis, and reduce pain associated with bone fractures. In addition, it is being investigated for its potential in managing metabolic disorders like obesity and diabetes due to its ability to regulate blood glucose and lipid profiles. Despite its promising benefits, further clinical studies are needed to validate its efficacy and safety for therapeutic use.

INTRODUCTION

Cissus quadrangularis, commonly known as "Veldt Grape" or "Adamant Creeper," is a perennial plant belonging to the Vitaceae family. Native to tropical and subtropical regions of Africa and Asia, it has gained attention for its medicinal properties and is widely used in traditional medicine. This plant features a fleshy, succulent stem that is often angular in shape, giving it a distinctive appearance. Its stems and leaves are typically used in the preparation of various herbal remedies.

In traditional medicine systems like Ayurveda and Traditional African Medicine, Cissus quadrangularis has been utilized for its wide array of therapeutic benefits, particularly for its anti-inflammatory, analgesic, and antioxidant properties. It has been studied for its potential in supporting bone health, improving joint function, and aiding in the healing of fractures, among other uses. Additionally, it is often used for managing weight, controlling blood sugar, and promoting overall vitality.

Phytochemical Constituents and Mechanisms of Action

Cissus quadrangularis contains a rich array of bioactive compounds, including flavonoids, alkaloids, triterpenoids, and phenolic acids. These compounds contribute to its medicinal properties, which include promoting collagen synthesis, enhancing bone mineral density, reducing inflammation, and supporting wound healing. Some studies suggest that its compounds may also play a role in reducing oxidative stress, improving metabolic function, and supporting gastrointestinal health.

Biological Source

Cissus Quadrangularis

1. Family: Vitaceae (the grape family)
2. Biological Source: The biological source of Cissus quadrangularis is the aerial parts of the plant, particularly the stem. It is a succulent, perennial herb with a distinctive four-angled (quadrangular) stem.
3. Chemical Constituents: Cissus quadrangularis is rich in various bioactive compounds, which contribute to its medicinal properties. Some of the key chemical constituents include:

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Flavonoids: These include compounds like quercetin, kaempferol, and other glycosides, which have antioxidant and anti-inflammatory effects.

Alkaloids: Cissus quadrangularis contains alkaloids, which may contribute to its analgesic (pain-relieving) properties.

Phenolic Acids: These include chlorogenic acid, caffeic acid, and ferulic acid, which have antioxidant and anti-inflammatory properties.

Triterpenoids: Compounds like oleanolic acid and ursolic acid, which are known for their anti-inflammatory and hepatoprotective effects.

Steroids: Cissus quadrangularis contains sterols, such as β-sitosterol, which may contribute to its anti-inflammatory and anti-cancer properties.

Flavonol Glycosides: These compounds are important for the antioxidant activity of Cissus quadrangularis.

Vitamins and Minerals: Cissus quadrangularis also contains important nutrients such as vitamin C, carotenoids, and calcium, which support bone health and healing processes.

Resins and Tannins: These have astringent properties and contribute to the plant's antimicrobial and wound-healing effects.

These active compounds work synergistically to provide Cissus quadrangularis with its reputed benefits, including promoting bone health, aiding in wound healing, reducing inflammation, and improving metabolic functions.

Material and Methods of Cissus Quadrangularis



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The following is a detailed example of materials and methods typically used in scientific studies involving Cissus quadrangularis, such as studies on its phytochemical properties, pharmacological effects (e.g., anti-inflammatory, bone healing), and other therapeutic potential.

1.Collection of Plant Material

Plant Part Used: The stems of Cissus quadrangularis are most commonly used for extraction in medicinal studies, as they contain the highest concentration of bioactive compounds.

Collection: Fresh or dried aerial parts (stems, leaves) of Cissus quadrangularis are collected from local herb gardens, commercial suppliers, or wild habitats in tropical and subtropical regions.

2. Preparation of Plant Extracts

The preparation of extracts is essential for isolating the active compounds of Cissus quadrangularis.

Drying: The collected plant material (stems) is washed to remove dirt and then dried in the shade for several days.

Grinding: The dried stems are ground into a fine powder using a mechanical grinder or mortar and pestle.

Solvent Extraction

Ethanolic Extraction: A known method to extract a wide variety of bioactive compounds. The powdered plant material is macerated in ethanol (95%) for 48-72 hours at room temperature, with occasional shaking. Afterward, the mixture is filtered, and the solvent is evaporated under reduced pressure to yield the ethanolic extract.

Aqueous Extraction: Fresh plant material may be boiled in water to prepare an aqueous extract, which is often used for traditional medicinal purposes.



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3. Phytochemical Screening

Phytochemical screening is conducted to identify and analyze the presence of bioactive compounds in the extracts.

Alkaloids: Dragendorff's reagent or Mayer's reagent is used to test for the presence of alkaloids.

Flavonoids: Shinoda's test or the alkaline reagent test detects the presence of flavonoids.

Triterpenoids and Steroids: Liebermann-Burchard test is used to detect triterpenoids and steroids.

Saponins: Foam test to detect the presence of saponins.

Tannins: Ferric chloride test is used to detect tannins.

4. Analytical Techniques

-To confirm and quantify the chemical composition of Cissus quadrangularis extracts, the following methods may be used:

Thin Layer Chromatography (TLC): TLC is used to separate and identify different compounds in the plant extract. A solvent system is chosen based on the nature of the compounds (e.g., polar or non-polar).

High-Performance Liquid Chromatography (HPLC): For the quantitative analysis of specific compounds, such as flavonoids (e.g., quercetin, kaempferol) or phenolic acids.

Gas Chromatography-Mass Spectrometry (GC-MS): Used for identifying volatile organic compounds in the extracts.

Fourier Transform Infrared Spectroscopy (FTIR): Used to identify functional groups in the plant extract based on their vibration frequencies.

5. Pharmacological Evaluation

Pharmacological activity is evaluated through a series of in vitro and in vivo tests, depending on the specific therapeutic effects under investigation (e.g., anti-inflammatory, antioxidant, bone healing, etc.).

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Anti-inflammatory Activity
In vitro:
Enzyme inhibition assays like COX-1 and COX-2 inhibition.
Measurement of nitric oxide production in macrophage cell lines .
In vivo:
Carrageenan-induced paw edema model in rats: The anti-inflammatory effect is tested by measuring paw volume at different time intervals after injection of carrageenan and treatment with Cissus quadrangularis extraction.

Bone Healing and Osteogenic Activity
In vivo (Bone Healing Model):
The bone healing potential is tested using an animal fracture model (e.g., rats). A fracture is induced (e.g., mid-shaft femur fracture), and Cissus quadrangularis extract is applied topically or administered orally.

Parameters such as healing time, fracture callus formation, and bone mineral density are measured using radiographs or histological analysis.

Histopathology
After a certain period, animals are euthanized, and bone samples are collected for histopathological examination, where the new bone formation and the quality of healing are assessed under a microscope.

6. Antioxidant Activity
Antioxidant activity is tested to evaluate the potential of Cissus quadrangularis in scavenging free radicals.

In vitro assays:
DPPH (2,2-Diphenyl-1-picrylhydrazyl) Assay: A common method to measure the free radical scavenging activity of the extract.

ABTS (2,2'-Azino-bis(3-ethylbenzothiazoline-6-sulfonic acid)) Assay: Another test to assess the antioxidant potential by measuring the reduction of ABTS radical cations.

In vivo assays: Measurement of oxidative stress markers in rats (e.g., malondialdehyde, superoxide dismutase, catalas.

7. Statistical Analysis
After collecting data from various experiments, statistical analysis is performed to determine the significance of the findings.
Software: SPSS, GraphPad Prism, or similar software is used for statistical analysis.
Analysis Methods: Analysis of variance (ANOVA) followed by post-hoc tests (e.g., Tukey's test) is commonly used to compare different treatment groups. Results are typically presented as mean ± standard deviation (SD), and significance is set at $p < 0.05$

Advantage of Cissus Quabdragylaris
Cissus quadrangularis, also known as “Veldt grape” or “bone setter,” is a plant commonly used in traditional medicine for its potential health benefits. Some of its reported advantages include:

1. Bone Health & Joint Support: It is most well-known for promoting bone healing and reducing joint pain. It may help in treating fractures and improving bone mineral density, making it beneficial for conditions like osteoporosis or arthritis.
2. Anti-inflammatory Properties: The plant contains compounds that may help reduce inflammation in the body, which can aid in managing conditions like arthritis or general inflammation.
3. Weight Management: Some studies suggest that Cissus quadrangularis might help in weight management by supporting fat metabolism and improving overall body composition.
4. Antioxidant Effects: The plant is rich in antioxidants, which help combat oxidative stress and protect cells from damage caused by free radicals.
5. Digestive Health: It has been used traditionally to support digestive health, including reducing symptoms of indigestion and improving gut health.
6. Blood Sugar Regulation: Preliminary research suggests that Cissus quadrangularis might help regulate blood sugar levels, potentially supporting individuals with type 2 diabetes.

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7. Liver Health: There is some evidence to suggest that Cissus quadrangularis may have protective effects on the liver, helping to detoxify and reduce liver damage.

Evaluation test for Cissus Quabdragylaris

Cissus quadrangularis is a plant commonly used in traditional medicine for its purported benefits in bone health, weight management, and as an anti-inflammatory. It is important to evaluate Cissus quadrangularis from multiple angles, such as its pharmacological properties, clinical applications, and potential side effects. Below is a general framework for evaluating Cissus quadrangularis, along with references from scientific literature:

- Pharmacological Properties

Active Compounds: Cissus quadrangularis contains bioactive compounds such as flavonoids, alkaloids, phenolic acids, and triterpenoids. These compounds are believed to contribute to its medicinal properties.

Anti-inflammatory Activity: Cissus quadrangularis has been shown to have anti-inflammatory effects in various studies. Its ability to reduce markers of inflammation could be beneficial for conditions like arthritis.

Bone Health: The plant is often used for its purported ability to promote bone healing, particularly in fractures. Studies suggest that Cissus quadrangularis may enhance the formation of bone matrix and improve calcium metabolism.

- Clinical Applications

Bone Fractures: Clinical studies have reported that Cissus quadrangularis may accelerate healing in bone fractures and improve the recovery process. This effect is thought to be related to its ability to stimulate collagen synthesis and increase osteoblast activity.

Obesity and Weight Management: Cissus quadrangularis is sometimes used for weight loss. Research suggests that it may help in weight reduction by increasing metabolic rate and reducing appetite.

Osteoarthritis: Some studies have found that it may be effective in reducing the symptoms of osteoarthritis by decreasing joint pain and improving mobility.

- Toxicity and Side Effects

Safety Profile: Cissus quadrangularis is generally considered safe when used as directed, but overuse may lead to mild side effects like gastrointestinal disturbances or allergic reactions. Long-term safety data is still limited.

Interactions: There is limited information on potential drug interactions, but individuals taking medications for diabetes or hypertension should use caution, as Cissus quadrangularis might influence blood sugar levels or blood pressure.

- Formulations and Dosage

Dosage Forms: Cissus quadrangularis is available in various forms, including powder, capsules, tablets, and extracts.

Recommended Dosage: In clinical studies, dosages have ranged from 300 mg to 1,200 mg daily, depending on the form and specific health condition. It is always important to follow recommended guidelines or consult a healthcare professional before using it as a supplement

- Conclusion

Cissus quadrangularis holds promise for several therapeutic applications, particularly in bone health and weight management. However, more large-scale clinical trials are needed to confirm its efficacy and safety, as well as to establish standardized dosages and treatment regimens.

CONCLUSIONS

Cissus quadrangularis, a plant commonly used in traditional medicine, has attracted attention for its potential therapeutic properties, especially in the fields of bone health, weight management, and antioxidant activity. Studies suggest that the plant's bioactive compounds may promote the healing of fractures, reduce inflammation, and improve joint health. Additionally, its potential to support weight loss

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through various mechanisms, including appetite regulation and fat metabolism, has been explored. Cissus quadrangularis also exhibits antioxidant and anti-inflammatory properties that could offer benefits for conditions like arthritis.

Conclusion: Cissus quadrangularis appears to hold promise in various therapeutic areas, particularly for musculoskeletal health and weight management. However, while preliminary studies are promising, further clinical trials are necessary to establish optimal dosages, confirm long-term efficacy, and fully understand its mechanisms of action.

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