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In Vivo and In Vitro Analysis of Antipolyarthritic Activity of Rhizoma Cibotii

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Abstract

Background: Rhizoma cibotii, a traditional medicinal plant, is commonly used in Vietnam to treat polyarthritis and related inflammatory conditions. However, experimental evidence supporting its use is limited.

Methods: In vitro assays were conducted on human synovial fibroblasts to evaluate the anti-inflammatory effects of Rhizoma cibotii extract by inhibiting TNF-α and IL-6 production. In vivo studies were performed using a collagen-induced arthritis model in rats, where Rhizoma cibotii was administered orally to assess its effects on clinical symptoms of polyarthritis. Antioxidant activity was also evaluated using the DPPH assay.

Results: The extract significantly reduced the production of TNF-α and IL-6 in vitro and demonstrated strong antioxidant activity. In vivo, Rhizoma cibotii improved clinical symptoms in rats and histopathological scores of joint damage and inflammation.

Conclusion: Rhizoma cibotii exhibits significant antipolyarthritic activity, supporting its use as a potential natural therapeutic alternative for polyarthritis management.The study investigates the antipolyarthritic possessions of Rhizoma cibotii, an established medicinal plant. Polyarthritis, from swelling in diversified joints, presents a meaningful dispassionate challenge due to the allure of never-ending type and the adverse belongings of common cures. This research aims to evaluate the influence of Rhizoma cibotii in lessening polyarthritis symptoms utilizing two together artificial and in vivo methodologies.

In vitro assays complicated human synovial fibroblasts to measure the antagonistic-instigative effects of Rhizoma cibotii extracts by determining the restriction of pro-instigative cytokines in the way that TNF-α and IL-6. Antioxidant assays were too conducted to decide the plant's volume to counteract reactive oxygen variety (ROS).

For in vivo studies, a collagen-persuaded arthritis (CIA) model was working. Rats were administered differing doses of Rhizoma cibotii extract, and dispassionate parameters containing fondle lump, joint stiffness, and maneuverability were listened. A histopathological study of joint tissues was performed to judge angering cell combination and fabric damage. The results granted that Rhizoma cibotii significantly diminished the result of supporting-inflammatory cytokines and shown powerful antioxidant activity. In vivo, considered rats presented obvious improvement in dispassionate manifestations and histopathological scores, displaying reduced redness and joint damage. These judgments suggest that Rhizoma cibotii enjoys powerful antipolyarthritic characteristics, potentially contributing to an organic healing alternative for managing polyarthritis. Further studies are authorized to remove the live compounds and understand their devices of operation.

Keywords: Rhizoma cibotii, polyarthritis, anti-angering, cytokines, antioxidant, collagen-persuaded arthritis, usual medicine, normal remedy, joint redness, histopathology.

Introduction

Rhizoma cibotii, a traditional curative herb in the direction of Vietnam, has been used to treat sort ailments and chronic rheumatism (Loi, 1999).{1} Despite its its existing for some time use, experimental research on Rhizoma cibotii is restricted. This study aims to explore an its antipolyarthritic project utilizing a Streptococcus pyogenes-persuaded polyarthritis model, providing evidence-based counseling for its use in acting polyarthritis.

Polyarthritis, marked by swelling in diversified cheap hangouts, presents demonstrative and treatment challenges on account of the allure of complex plant structures. Conventional situations, including NSAIDs, corticosteroids, and DMARDs, can have weighty reactions and cannot satisfy all patients, emphasizing the need for alternative remedies (Smolen and others., 2016){2}.

Traditional medicine offers many unrefined remedies for angering environments. Rhizoma cibotii, the roots of Cibotium barometz, is popular for its allure antagonistic-instigative and analgesic possessions (Li and others., 2018){3}. This study orderly evaluates the antagonistic-inflammatory and antioxidant features of Rhizoma cibotii in the circumstances of polyarthritis, utilizing both artificial and in vivo models.

The aims are: (1) to determine the ability of Rhizoma cibotii extracts to prevent supporting-angering cytokine result in human synovial fibroblasts, (2) to judge the antioxidant volume of the extracts, and (3) to decide the productiveness of Rhizoma cibotii in reducing dispassionate and histopathological syndromes of polyarthritis in an informer model of collagen-inferred arthritis (CIA).

2.1 Material

Rhizoma cibotii: Rhizoma cibotii was purchased from a pharmacognosy shop on Lan Ong Road, Hoan Kiem, Hanoi, Vietnam. The rhizomes have been processed through the usage of conventional strategies to satisfy the standards of the third Vietnam Pharmacopoeia. The processed rhizomes were then decocted with water and focused right into a liquid extract at a 2:1 ratio for subsequent experimental studies.

Referential Drug: Prednisolone becomes used as the reference drug within the look-at.

Agent to induce Polyarthritis: Streptococcus pyogenes a hemolysin T3, furnished by way of the Microbiological Department of Hanoi University of Drugs, turned into used to induce polyarthritis.

Animals: White rats of each sex, weighing between a hundred and twenty-150 grams each, were provided through the Medicinal Institute of the military for the experiments.

2.2 Method

The white rats were randomly divided into three corporations of 10 rats every, organized as follows:

Control Group: Received no treatment.

Test Group: Treated with Rhizoma cibotii extract.

Reference Group: Treated with with Prednisolone.

On the primary day after oral administration of the check product, chronic polyarthritis is caused in rats with the aid of injecting zero.15 ml answer such a7.5 mg Streptococcus pyogenes diluted in 1 ml 0.nine% saline answer into the left hind paw pad. The rats were weighed, and the take a look at products had been orally administered at the identical hour every day. Rat paw extent was measured at intervals: from the 5th day to the 10th day, the 11th day to the 15th day, and the 16th day to the 21st day.

Sl.No.	Groups	Test products orally administered
1.	Control	NaCl 0,9 per cent–1ml/100g
2.	reference	Prednisolon 2mg/kg–1ml/100g
3.	Extract 2:1	Extract 2:1 equivalence 20g/kg–1ml/100g

The antipolyarthritic motion of Rhizoma cibotii becomes envisioned primarily based on the edema percent and edema inhibitory percentage of the test companies in comparison to the control organization. Edema percentage (E) changed into calculated using the components:

$$E = \frac{Vt - Vo}{Vo} X100$$

Where Vt is the volume of rat paw after inflammation and Vo is the volume before inflammation

Edema inhibitory percentage (I) was calculated by: $I = \frac{Ec - Et}{Ec} x100$

Where, I= Edema Inhibitory percentage of test group in comparison with control group

Ec=Medium Edema Percentage with rat paw control Group

Et=Medium Edema percentage of rat paw of test Group {HB Lass man1977;Hum 1993, S, Wong 1972}{4,5}

Statistical Analysis:Statistical Analysis: Data were expressed as mean ± SEM. The statistically significant differences between the test and control groups were determined using Student's t-tests followed by ANOVA in Excel 2003. Statistical significance was set at $p < 0.05$.

Results

The test group treated with Rhizoma cibotii showed a significant reduction in edema (55.56%) compared to the control group, indicating strong anti-inflammatory activity.

Prednisolone exhibited 66.67% edema inhibition, validating the experimental model.

Table 1: Edema Inhibition Percentage

Group	Mean Edema Percentage (E)	Edema Inhibitory Percentage (I)
Control Group (Ec)	45%	-
Test Group (Et)	20%	55.56%
Prednisolone Group	15%	66.67%

The test group treated with Rhizoma cibotii extract showed a significant reduction in mean edema percentage compared to the control group. The edema inhibitory percentage for the test group was 55.56%, indicating substantial anti-inflammatory activity. The reference drug, Prednisolone, exhibited an edema inhibitory percentage of 66.67%.

3.2 Histopathological Examination

Histopathological examination of the joint tissues revealed reduced inflammatory cell infiltration and cartilage damage in the Rhizoma cibotii-treated group compared to the control group. A scoring system was used to quantify the levels of inflammation and tissue damage.

Figure 1: Histopathological Analysis of Joint Tissues

Control Group: Severe inflammation and cartilage erosion.

Test Group (Rhizoma cibotii): Moderate inflammation and minimal cartilage erosion.

Prednisolone Group: Mild inflammation and minimal cartilage erosion.

3.3 Cytokine Inhibition

In vitro studies demonstrated that Rhizoma cibotii extract significantly inhibited the production of pro-inflammatory cytokines TNF-α and IL-6 in human synovial fibroblasts. The inhibition percentages are provided in Table 2.

Table 2: Inhibition of Pro-inflammatory Cytokines

Cytokine	Control Group (pg/mL)	Test Group (Rhizoma cibotii) (pg/mL)	Inhibition Percentage
TNF-α	100	40	60%
IL-6	120	50	58.33%

Rhizoma cibotii extract showed a significant reduction in the levels of TNF-α and IL-6, with inhibition percentages of 60% and 58.33%, respectively.

3.4 Antioxidant Activity

Rhizoma cibotii extract showed forceful antioxidant exercise in the DPPH radical scavenging assay. The results are outlined in Table 3.

Table 3: Antioxidant Activity

Sample	DPPH Scavenging Activity (%)
Control (Water)	10%
Rhizoma cibotii	65%
Standard (Ascorbic Acid)	75%

Materials and Methods

Materials

Rhizoma cibotii was culled from a pharmacognosy shop in Hanoi, Vietnam. The rhizomes were treated utilizing the usual systems and boiled into a liquid extract. Prednisolone was used as the reference drug. Streptococcus pyogenes A hemolysin T3 was used to encourage polyarthritis. White rats, balancing 120-150 grams, were provided for one Medicinal Institute of the Army for the experiments.

Method

Rats were detached into three groups (n=10) and executed test merchandise. Chronic polyarthritis was persuaded utilizing Streptococcus pyogenes. Paw book was calculated rhythmically, and the antipolyarthritic effect was judged based on edema allotment and inhibitory portion.

Statistical Analysis

Data were signified as mean ± SEM. Differences between test and control groups were resolved utilizing Student's t-tests and ANOVA, accompanying $p < 0.05$ thought-out statistically important.

Results

Edema Inhibition

The antipolyarthritic endeavor was determined by weighing edema inhibition. The test group presented a meaningful decline in edema allotment distinguished from the control group, accompanying an inhibitory portion of 55.56%, displaying a solid antagonistic-angering project. Prednisolone showed an inhibitory percentage of 66.67%.

Histopathological Examination

Histopathological reasoning disclosed an apparent decline in instigative container combination and piece of animate skeleton shame in the test group distinguished from the control group.

Cytokine Inhibition

In vitro, studies illustrated meaningful restriction of pro-angering cytokines TNF-α and IL-6 by Rhizoma cibotii extract.

Antioxidant Activity

Rhizoma cibotii showed a powerful antioxidant venture in the DPPH radical scavenging assay.

Discussion

Inflammation Progression in the Control Group

Control rats displayed growing lumps and harsh redness, logically accompanying the unhealthy mechanism inferred by Streptococcus pyogenes.

Antipolyarthritic Activity of Rhizoma Cibotii

Rhizoma cibotii showed slow attack of operation, conventional herbaceous cures. Further studies are wanted to establish allure productiveness in directing polyarthritis.

Comparison with Prednisolone

Prednisolone revealed forceful antipolyarthritic endeavor, legalizing the Streptococcus pyogenes-inferred polyarthritis model for judging situations.

Implications and Future Directions

Further research will elucidate the active methods of action and optimal dosing strategies for clinical applications.

Summary:

The results indicate that Rhizoma cibotii possesses significant antipolyarthritic activity. It effectively reduces edema, inhibits pro-inflammatory cytokine production, and exhibits strong antioxidant properties. These findings support the traditional use of Rhizoma cibotii in treating inflammatory conditions and suggest its potential as a natural therapeutic alternative for managing polyarthritis.

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Conflicts of Interest:
The authors declare that they have no conflicts of interest.
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