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Analgesic Efficacy of Leaf and Root Decoction of *Salacia korthalsiana* Mig. (Polipog)

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Abstract

This study was conducted to determine the analgesic efficacy of the leaf and root decoction of *Salacia korthalsiana* Miq (Polipog) found in Brgy. Imelda Mondragon Northern Samar, Philippines.

Decocted Root of polipog has a boiling point of 91.1°C, reddish brown color, unpleasant odor, and a pH of 6.39 which is weakly acidic. It is miscible in both water and ethanol and immiscible in toluene which indicates that it is polar. Decocted Leaf of polipog has a boiling point of 90.9°C, yellowish in color, pleasant odor, and a pH of 6.42 which is weakly acidic. The decocted leaf is miscible in both water and ethanol and immiscible in toluene which indicates that it is also polar. The presence of functional groups was also determined using Fourier Transform Infrared Spectroscopy (FTIR). Graphs of FTIR revealed spectra with peaks found to be amine, amide, alkene, carboxylic acid and aromatic functional groups.

Following the Acetic-acid induced writhing procedure, the lowest average number of squirms was recorded using the paracetamol (positive control) and the highest average number of squirms was obtained using distilled water (negative control). The decocted leaf and root have almost the same results in terms of number of squirms and in percent reduction of squirms. Analysis of variance revealed that there is no significant difference between the analgesic effect of decocted leaf and root of polipog and paracetamol. This result means that the decocted leaf and root of polipog has analgesic efficacy and it is comparable to the commercial medicine.

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Polipog leaf; Polipog root; Decoction; Analgesic efficacy; Writhing test

1. Introduction

Pain is a highly unpleasant physical sensation caused by illness or injury, or something that hurts the body. Analgesics are drugs used to relieve pain without inducing anesthesia. Analgesics in general are known as pain killer. Aspirin and paracetamol are examples of an analgesic.

Herbal medicine is defined as the use of natural herbs and plant for the treatment or prevention of diseases, disorders and for the promotion of good health. Medicinal herbs have been used by our Filipino forefathers for many centuries.

Salacia korthalsiana Miq (Polipog) is generally a climbing shrub with woody stems that twine into the surrounding vegetation and can be up to 18 meters long. Occasionally, the plant produces erect branches and its then more shrub-like, or even tree. This plant is harvested from the wild for local use as food and medicine. Polipog is a newly discovered plant and now considered as effective herbal medicine. Due to the many traditional significance of polipog, the researchers decided to conduct a study regarding the analgesic efficacy of this plant's decoction.

2. Related Literature and Studies

Salacia korthalsiana Miq is generally a climbing shrub with woody stems that twine into the surrounding vegetation. There are two types of Polipog; the tree from which large branches and grows abundantly in deep forest. Its roots are big. The other one is a vine from with deciduous green leaves and small branches. This type of polipog can grow in a roadside and backyard. The plant is harvested from the wild for local use as food and medicine.



Figure 1. Leaves of Polipog Vine

Several studies have been done investigating the analgesic potential of different plants. Rauf ,et. al (2017) studied the analgesic potential of extracts and derived natural products from medicinal plants. They summarize the literature pertaining to plants and their constituents discovered with analgesic potential in the last four decades. Some naturally obtained agents having analgesic activity found in their list are aspirin, morphine, codeine, and thebaine.

Kokabian Zahra (2014), evaluated the analgesic effect of *Tragopogon graminifolius* hydroethanolic extract in male mice. They indicated that doses of 200 and 400 mg/kg hydroalcoholic extract of *Tragopogon graminifolius* (HET) significantly increased pain threshold compared with the control group in writhing and tail flick tests. Also dose 400 mg/kg have been showed mostly analgesic effect in both tests compare with

morphine group. In their study, analgesic effect of the HET was observed in the tail flick and writhing tests and this analgesic effect of extract probably related to activation of opioid system.

Dianito (2017) had conducted a study on analgesic potential of polipog leaf extract using mice as experimental animal. She stated that the leaf extract has brown color, unpleasant odor and is weakly acidic. She concluded that the Polipog leaf extract has lesser analgesic effect as compared to the commercial medicine but could still be considered as an alternative medicine in treating pain.

This study evaluated the capacity of the leaves and roots of polipog plant decoction to relieve pain. Laboratory trials are needed to prove that the plant has therapeutic value and can be an effective alternative pain-relieving medicine.

3. Objectives of the Study

This study aimed to determine the Analgesic Efficacy of the leaf and root decoction of *Salacia korthalsiana* Miq (Polipog). Specifically, this study tried to determine the:

- 3.1. Physical properties of the leaf and root decoction of polipog in terms of: color, odor, pH, solubility, and boiling point;
- 3.2. Functional group present in polipog using the Fourier Transform Infrared Spectroscopy (FTIR) analysis;
- 3.3. Percentage reduction of squirms of albino mice using leaf and root decoction and
- 3.4. Decoction that significantly contributed to the analgesic efficacy of polipog.

4. Methodology

4.1 Preparation of Samples

The *Salacia korthalsiana* Miq (Polipog) leaves and roots were collected at Brgy. Imelda Mondragon N. Samar. These leaves (100g) and roots (100g) were brought to the College of Science Laboratory for decoction and further preparation.

The fresh leaves and roots of Polipog were washed and weighed. The leaves of polipog were air dried and the roots were sun dried followed by the preparation of decoction using a 300 mL of distilled water by boiling for about 30-40 minutes (volume reduced to ½). After boiling, the sample was transferred to a beaker. The decocted plant was filtered using a filter paper to isolate the liquid extract from solid materials. The filtrate (liquid product) was placed in a clean bottle and set aside for the analgesic efficacy testing to albino mice and for the physical properties. Same goes to the roots of polipog.

For the preparation of the positive control, 1 mL of 120 mg/ 5 mL biogestic syrup was used and 3 mL of distilled water was added (1:3). Dosage for each mice was 0.2 mL per 20 gbw.

4.2 Determination of Physical Properties

The physical properties of Polipog leaf and root decoctions were evaluated in terms of color, odor, pH, solubility, and boiling point. The color and odor were assessed by five evaluators using sensory evaluation. The pH, solubility (against distilled water, ethanol and toluene), and boiling point were evaluated using standard laboratory procedures in three trials.

4.3 FTIR Analysis

The dried powdered samples of leaves and roots of Polipog were submitted to the University of Santo Tomas, Manila to determine the functional groups present in the sample by using Fourier Transformed Infrared (FTIR).

4.4 Percentage Reduction of Squirms

Twelve (12) albino mice, weighing 20-45 grams each, regardless of sex, were purchased from established pet shop. These animals were placed in cages and were given enough food and water before the experiment.

Acetic acid- induced test was used to evaluate the analgesic efficacy of polipog decoctions. In this test the response to intraperitoneally injection of an acetic acid solution is a contraction of the abdominal muscle and stretching of the hind limbs induced according to the method described by (Winter et al., 1963). Mice was randomly divided into four treatments and were administered 15% acetic acid 0.2 mL per 20 grams body weight. The number of abdominal constrictions were registered over 15 minutes. Starting 5 minutes after acetic acid injection, mice were treated intraperitoneally as follows: Treatment 1- distilled water; Treatment 2- leaf decoction; Treatment 3- root decoction; Treatment 4- paracetamol.

To compute for percent reduction in squirms:

$$= \frac{\text{no of squirms (acetic acid + control)} - \text{no of squirms (acetic acid + plant decoction)}}{\text{no of squirms (acetic acid + control)}} \times 100$$

4.5 Comparison of Analgesic Efficacy of Polipog Leaf, Polipog Root, and Commercial Medicine

The percent reduction of squirms using the different treatments were compared and analyzed. Analysis of variance (ANOVA) was used to test significant differences between treatments.

5. Results

Physical Properties. The physical properties of Polipog leaf and root were shown in the table below.

Table 1. Physical Properties of Polipog Leaf and Root Decoctions

Properties	Polipog Leaf	Polipog Root
Color	Yellowish	Brownish red
Odor	Pleasant	Unpleasant
pH	6.42	6.39
Solubility		
water	Miscible	Miscible
Ethanol	Miscible	Miscible
Toluene	Immiscible	Immiscible
Boiling Point	90.9°C	91.1°C

The table above shows that the decoctions obtained from polipog leaves and roots have different physical properties except for solubility that indicated that both decoctions are polar. The leaf decoction showed higher pH than root decoction and root decoction has higher boiling point than that of the leaf.

Fourier Transformed Infrared Results

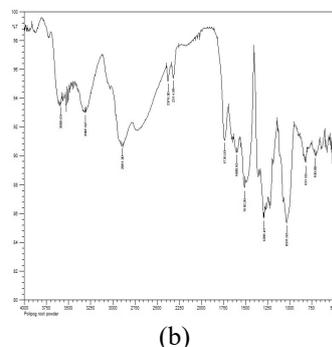


Figure 2. FTIR Spectra of (a) Polipog Leaves, (b) Polipog Roots

Fourier Transformed Infrared results revealed almost similar IR graph for both the dried leaves and roots of polipog. Peaks from both these graphs show an sp^2 and sp^3 C-H stretch, C=C, C=O, C≡N, amine, alkene, carboxylic acid and aromatic functional groups.

Analgesic Efficacy. Analgesic efficacy of the different treatments are analysed based on the percent reduction of squirms in test animals.

Table 2. Average Number of Squirms and Percent Reduction Using Different Treatments

Treatments	Average Number of squirms	Percent Reduction
Acetic Acid + Distilled Water (control)	32	
Acetic Acid + Leaf Decoction	17	46.9 %
Acetic Acid + Root Decoction	16	50.0 %
Acetic Acid + Paracetamol solution	12	62.5 %

Table 2 shows the average number of squirms of experimental mice in different treatments. It shows that the paracetamol (positive control) has the lowest average number of squirms and the distilled water (negative control) has the highest average number of squirms. Paracetamol solution has the biggest percent reduction in the number of squirms. The decocted leaf and root has a small difference in the average number of squirms and in percent reduction of squirms.

ANOVA was used to test significant difference of the different treatments (polipog leaf, polipog root and paracetamol) in terms of its analgesic efficacy. Number of squirms of mice in different treatments was used in the analysis. Results revealed that there is no significant difference between the different treatments. This means that the decocted leaf and root of polipog is comparable with the commercial medicine (paracetamol solution) in terms of reducing pain in mice.

6. Conclusions

Based on the findings of this study, the researcher concludes that both the leaf and roots are polar substance but are different in other physical properties tested. The functional groups that were present in both the leaf and root samples are amine, amide, alkene, carboxylic acid and aromatic groups. The decocted leaf and root of polipog can reduce pain and it is comparable to the commercial medicine.

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