Phytochemical Analysis of Taltalikod *(Phyllanthus niruri* Linn.)

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Abstract

The study was conducted to test the chemical substances present in taltalikod (Phyllanthus niruri).

This study made use of the experimental research design in actual laboratory set-up. Two phases were included in the pursuit of this study: the extraction process and the qualitative test (phytochemical screening).

Results showed that the taltalikod extract contained therapeutic substances such as alkaloids, glycosides, tannins, saponins, and sterols This implies that the plant can be a good source of treatment for cough, colds, hypertension, malaria, diarrhea, extensive burns, heart failure , rectal disorders, kidney stones, bedsores, ulcers, and sore throat,

Based on the conclusions, the researcher presents the following recommendations: a follow-up study should be conducted to quantify, isolate and identify the type of alkaloids, glycosides, tannins, saponins, slerols and flavonoids present in talalikod (Phyllanthas nirruri); the plant is recommended for microbiological and other pharmacological screenings; further studies on the plant's therapeutic properties should be conducted by interested researchers and drug companies; and the plant should be included in the compilation and documentation of medicinal plants in the Philippines through NRCP, DOST and UP and be indexed at the Plant Resources of Southeast Asia (PROSEA).

Introduction

Rationale

Herbal medicine, sometimes referred to as Herbalism or Botanical Medicine, is the use of herbs for their therapeutic or medicinal value. Herbs are plants known for their medicinal, aromatic or savory qualities. They contain a variety of chemical substances that act upon the body.

Herbal medicine is the oldest form of healthcare known to mankind. Herbs had been used by all cultures throughout history. The earliest records are found in Babylonia circa 1770 BC specifically in the Code of Hammurabi and in Egypt circa 1550 RC. In fact, ancient Egyptians believed medicinal plants to have utility even in the afterlife of their pharaohs. (http://wwyy.people vcu.edu/urdesai/car.htm).

Many of the medicinal uses of plants had been developed through observations on the effects to animals. People methodically collected information on herbs and developed well-defined herbal pharmacopoeias. Indeed, in the 20" century, many of the pharmacopoeias of scientific medicine were derived from herbal lore of native peoples in different countries. Many drugs commonly used today are of herbal origin. Indeed about 25 percent of the prescription drugs' dispensed in the United States contain at least one active ingredient derived from plant material. Some are made from plant extracts; others are synthesized to mimic natural plant compounds.

The World Health Organization (WHO) estimated that 4 billion people or 80% of the world population use herbal medicine for some aspects of primary health care. Herbal medicine is a major component in all indigenous peoples' traditional medicine and a common element in Ayurvedie, homeopathic, naturopathic, traditional oriental, and Native American Indian medicine. WHO noted that out of 199 plant-derived pharmaceutical medicines, about 74 percent are used in ways that are correlated directly with the plants' traditional or native medicinal use. Major pharmaceutical companies are currently conducting extensive research on plant materials gathered from the rainforests and other places for their potential medicinal value.

The Philippines is rich in medicinal plants. The forests contain a number of incredibly diverse plant species many of which are still unexplored and potentially useful as medicinal sources. Scientists have also realized that study of the native cultures can provide enormously valuable clues in the search for improved health. It is a known fact, that most plants contain necessary raw materials needed in the preparation of pharmaceutical and industrial products. The said raw materials are most of the time imported from other countries and obtained at a high cost. For this reason, it is high time that people in the scientific field start investigating and utilizing the different medicinal plants in the Philippines in order to produce a safe and therapeutically effective drug thus improving also our national economy by saving dollars.

Taltalikod, scientifically known as *Phyllanthus niruri*, is a common weed found throughout the Philippines. This is an erect, slender, branching smooth herb, 10 to 60 cm in height. The leaves are distichous, often imbricate and oblong to elliptic-oblong, 5 to 8 mm long rather pale beneath and very short stalks. The flowers are axillary, whitish or pale green, and about 0.5 mm long.

The capsules are smooth, rounded or somewhat flat, and 1.5 to 2 mm in diameter.

The researcher was greatly interested to look into the medicinal values of *taltalikod (Phylianthus niruri)* that clutter the yards of the people. If this plant is found to have medicinal propertes, it will attract scientists to make finished products that will cure quite a number of ailments. The common masses can just plant them in their backyards or in hanging pots and use them properly whenever any member of the family gets ill. This will serve as a free/cheaper source of medication. *Taltalikod* is not yet included in the list of medicinal plants so if found to have the different therapeutic constituents then it may be added to the compilation of data and documentation of Philippine Medicinal Plants.

Statement of the Problem

This study was conducted to test the chemical substances present in *taltalikod (Phyllanthus niruri* Linn.).

Review of Related Literature

Findings of past research works are hereby presented to further elaborate the current study.

Cachola (1989) conducted phytochemical and microbiological analyses of *karin luay (Euphorbia nerrifolia* Linn). Her findings in the phytochemical assay revealed that the plant contained alkaloids, tannins and resins while the pods contained tannins and resins only. The leaf extract treaied with ethanol and the pod extract treated with petroleum ether exhibited the highest degree of inhibition towards the growth of the three representative bacteria in the initial assay.

Banez (2002) performed phytochemical screening of *linlinna-aw (Peperomia pellucida* Linn.) and determined its analgesic, diuretic and anti-hypertensive properties. The present study is similar to the former study because phytochemical analysis was also used.

Phytochemical screening and microbiological assay of the roots, stems, and leaves of *Heliotripium indicum* Linn. *(Trompang Elepante)* was conducted by Vicente in 1989. The phytocbemical screening showed that the ethyl alcohol extract of the roots contained cardenolides, bufadienolides and flavonoids. The stems contained cardenolides and bufadienolides only. The leaves contained alkaloids, quaternary and/or amine oxide bases, flavonoids and tannins.

Methodology

Design of the Study. This study made use of the experimental research design in actual laboratory set-up. Two phases were included in the pursuit of this study:

Phase L_ The gathering of fresh *taltalikod,* the air drying process, the garbling and extraction processes were included in this phase. The collection, air-drying, garbling and extraction of *taltalikod (Phyllanthus niruri* Linn.) were done in UNP Laboratory, June-July 2003. Ethyl alcohol was used in the extraction process.

Phase Il. This phase included the qualitative tests (phytochemical screening) to determine the presence of alkaloids, glycosides, tannins, saponins, flavonoids, triterpenes and sterols in *talalikod (Phyllanthus niruri* Linn.) Qualitative tests for the whole plant constituents were done at DOST Bicutan, Taguig, Metro Manila from July to August 2003. No attempt was made to determine the amount of specific chemical constituents but rather, only the presence or absence of the general group of organic compounds.

Discussion of Results

Qualitative Tests

The therapeutic components of *taltalikod (Phyllanthus niruri* Linn.) are presented in Table I.

Table 1. Qualitative test of *talalikod (Phyllanthus nirri* Linn.)

Components	Alcoholic **Extract**	Indicators
Alkaloids	Traces (+)	Formation of yellowish and reddish precipitates
Glycosides	Traces (+)	Increase of brick red precipitates
Tannins	Moderate (++)	Heavy precipitates in the mixture
Saponins	Moderate (++)	Formation of honeycomb froths
Flavonoids	Negative (-)	No formation of red color
Sterols	Moderate (++)	Production of blue color
Triterpenes	Negative (-)	Pink color did not change to red

Alkaloids. As shown in Table 1, a yellowish precipitate for Mayer's test and reddish precipitate for Wagner's test indicated a positive result.

Many alkaloids, as impure compounds from natural sources, have been known from the earliest times. They were extracted from plants and valued because they were powerful poisons and medicines. It is difficult to classify compounds as alkaloids, but in general they are basic, nitrogen-containing compounds of vegetable origin having bitter taste and physiological activity. Most of the alkaloids are related chemically to pyrrole, pyridine, quinoline, or isoquinoline. Alkaloids are used in medicine as analgesic and *as* sedative. They reduce pain (Columbia Electronic Encyclopedia, 2003). They are particularly useful in cough remedies and they lower the reflex irritability of the respiratory centers.

They are also antihypertensive antineoplastic agents and they demonstrate encolytic property (anti-tumor activity). They are used to relieve nasal congestion, stop hemorrhage, stimulate muscles, combat malaria and dilate the pupil of the eye. (The US Education Encyclopedia, 1987) The leaves, stems, roots and flowers of *taltalikod* could be a potential cure for illnesses related to the above-mentioned uscs.

Glycosides. There was an increase of brick red precipitate in the hydrolyzed sample in Fehling's Test indicating that the leaves, stems, roots and flowers of the plant contained glycosides. Glycosides are frequently responsible for the physiological action of many herbs.

Glucose is the most common sugar component and the configuration is most often *B,* although many other sugars occur as glycosides, examples are arbutin, salicin, amygdalin, sinigrin, sucrose, raffinose, starch, and cellulose. However the name is usually applied to a compound in which part of the molecule is not a sugar (aglycon). Cardenolides and bufadienolides are cardiac glycosides. They are important in healing heart failure.

Tannins. /\ heavy precipitation in the mixture upon the addition of gelatin solution was observed. This indicates the presence of tannins in the plant.

The chief component of tannins is gallotannin or pentadigalloylglucose. Tannin, also called tannic acid, is a yellowish-white to light brown amorphous powder, glistening scales and spongy masses, usually odorless with a strong astringent taste. Recent reports show that tannins may have potential medicinal value. They could be used as treatment for diarrhea and extensive bums and are used for the relief of various rectal and excretory disorders. They can also be used in the treatment of bedsore and weeping ulcers. These tannins were also formerly used for sore throat and stomatitis (Anderson, 1985). Therefore, the plant could be a potential source of treatment of the above- mentioned diseases.

Saponins. The formation of honeycomb froths at 3.2 centimeters high in the froth test for saponins indicated a positive result. This means that the leaves and stems of *taltalikod* contain an emulsifying agent and can be used as detergent to replace soap. Many of the saponins are markedly toxic. They usually exert a powerful hemolytic action on red corpuscles. They can be used as fish poison. Steroidal saponins are of great importance because of their relationship to such compounds as sex hormones, cortisone, vitamin D and cardiac glycoside.

Flavonoids. The color test for flavonoids yielded negative results in the leaf, stem and root extracts. There was no formation of red color when the ethanol extract was treated with hydrochloric acid and magnesium turnings. This implies that *taltalikod* has no antifungal, anti-inflammatory and cytotoxic activities (Capal, 1992).

Sterols. A production of blue color in the Liebermann-Burchard test indicated the presence of sterols. The term "sterol" is applied to the members of a group of compounds having in common the cylcopentanoperhydrophenanthrene nucleus. All sterols/steriods may be considered derivatives of certain parent hydrocarbons. The estrogens that are formed from monomethylated steroid nuclei are derivatives of the parent compound, estrane.

Estrogens are substances capable of producing certain biological effect. They induce the growth of the female genital organs, the appearance of female secondary sex characteristics, and growth of the mammary duct system. Estrogens cause growth of the epithelium and musculature of the fallopian tubes, stimulate their contraction and motility, and are responsible for cyclic changes in tubal mucosa. They cause growth increases, tonus and rhythmic contractions of the uterine musculature, development of the endometrial mucosa and blood vessels that play an important role in normal menstruation. They are also largely responsible for the normal development of the external female genitalia, the duct system of the breast and the nipples and the secondary sex characteristics (Cantrous et.al, 1992).

Members of sterols are cholesterol, dehydrocholesterol and ergosterol. In the blood, the sterol plays an important role in transporting fatty acids in the form of cholesterol esters.

Dehydrocholesterol has a similar structure to cholesterol and differs only in having another double bond between 7 and 8 carbon position. Upon irradiation with ultraviolet rays, it is transformed into vitamin D. Ergosterol has the same nucleus as dehydrocholesterol only with slight difference at the side chain.

In the Philippines, where there is abundant natural sunlight, one is assured of a continuous supply of vitamin D through the irradiation of these substances. This is also responsible for the low incidence of rickets in the Philippines (Cabatit, 1997). Thus, the plant could be a source of medicine in the treatment of menstrual disorders and rickets and could be a good source of Vitamin D.

Triterpenes. The Liebermann-Burchardtest for tritcrpenes gave negative results for the leaves, stems and roots of *taltalikod*. The pink color did not change to red indicating the absence of triterpenes. This means that the plant is not a good source of vitamin A.

Conclusions

The ethanol extract of *taltalikod (Phyllanthus niruri* Linn.) contains therapeutic substances such as traces of alkaloids and glycosides and moderate amounts of tannins, saponins, and sterols. This implies that the plant can be a good source of treatment for cough, colds, hypertension, malaria, diarrhea, extensive bums, heart failure, rectal disorders, kidney stones, bedsores, ulcers, and sore throat. It can increase the volume of urine. It can normalize menstruation, stomatitis and rickets. The plant can also be used as detergent and

can be made into shampoos. Because of its bitter taste, it can be beneficial for the digestive system as an appetite stimulant and a fortifying toxic agent.

Recommendations

Based on the conclusions, the researcher presents the following recommendations:

I. A follow-up study should be conducted to quantify, isolate and identify the type of alkaloids, glycosides, tannins, saponins, sterols and flavonoids present in the leaves, stems, roots and flowers of *taltalikod (Phyllanthus niruri* Lin.)

2. The fruits of the plant are recommended for phytochemical screening

3. The plant is recommended for microbiological and other phannacological screenings.

4. Further studies on the plant's therapeutic properties should be conducted by interested researchers and drug companies.

5. The result of this research is recommended to be listed in the compilation and documentation of Medicinal Plants in the Philippines through NRCP, DOST and UP and be indexed at PROSEA, Plant Resource of Southeast Asia.

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