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Phytochemical Screening of the Leaf Extract of *Phylantus niruri*

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ABSTRACT

The purpose of this research was to investigate the phytochemical profile of *Phyllanthus niruri* leaf extract, which has long been utilised as an effective cure for a variety of diseases. Fresh *Phyllanthus niruri* leaves were obtained from Yola city and sent to the Department of Science Laboratory Technology Federal Polytechnic, Mubi, for identification. The phytochemicals were extracted and analysed using the solvent extraction technique, which employed methanol as the solvent. The results showed the presence of carbohydrates, alkaloids, tannins, steroids, flavonoids, and anthraquinone, but no saponin or glycosides. These results indicate that *Phyllanthus niruri* leaves contain bioactive chemicals with potential therapeutic use. The presence of alkaloids, tannins, and flavonoids may contribute to the plant's therapeutic properties, necessitating more study into isolation, characterisation, and pharmacological assessment.

Keywords: Phytochemicals, Phyllanthus niruri, Leaf extract and Methanol

INTRODUCTION

Herbal plants are used to cure a wide range of human disorders, and their usage is cosmopolitan and worldwide, especially in third-world nations owing to their ease of availability and inexpensive cost in comparison to modern Western medications. Plants having therapeutic powers are widely utilised, particularly by rural and/or tribal populations in remote places, not only now but also in ancient times, and are highly valued in certain tribal cultures owing to stories such as being a life tonic. These herbal pharmacological compositions have been utilised without scientific proof throughout human history, and they are currently being studied in clinical studies to discover their optimal and beneficial therapeutic dosage ranges [1]. In recent years, there has been a significant increase in interest in medicinal plant research. There is a considerable amount of research demonstrating the promising potential of medicinal plants employed in many traditional, complementary, and alternative ways of treating human diseases [2]. Medicinal plants include one or more phytochemical elements that may be combined to create effective medicinal medicines [3]. A medicinal plant is any plant that includes chemicals that may be employed for therapeutic reasons or serve as precursors for chemo-pharmaceutical semi-synthesis in one or more of its organs. The plant's leaves, roots, rhizomes, stems, and bark will all contain medicinally active chemical components [4]. These non-nutrient plant chemical compounds or bioactive components are also referred to as phytochemicals or phytoconstituents. A broad range of therapeutic plant extracts, such as flowers, leaves, barks, stems, fruits, and roots, have been processed for various pharmacological properties [5] and [6]. Capsularis includes beta-carotene for excellent eyesight, iron for healthy red blood cells, calcium for strong bones and teeth, vitamin C for smooth and clean skin, strong immune cells, and rapid wound healing. Jute leaf antioxidants have been associated to the prevention of chronic illnesses such as diabetes, heart disease, and hypertension [7]. Currently, up to 80% of the African population relies on traditional medicines for basic health care. Secondary metabolites capable of exerting specific physiological action on the body, such as alkaloids, flavonoids, steroids, tannins, phenol, and others, are often responsible for plant material's positive medical benefits [9]. Current antibiotic-related issues, such as the rise in the prevalence of multiple-drug resistant (MDR) strains of pathogenic bacteria such as methicillin-resistant Staphylococcus aureus, Helicobacter pylori, and MDR Klebsiela pneumonia, have rekindled interest in plants with antimicrobial properties. Furthermore, the rise in opportunistic

infections and the appearance of Corona virus (Covid-19), AIDS patients and individuals on immunosuppressive chemotherapy, and the toxicity of many antifungal and antiviral drugs have pushed the scientific community and pharmaceutical companies to look for alternative and novel drug sources. [10],[11],and[7] Herbal products have grown in popularity as alternative medicines become more prevalent in recent years. *Phyllanthus niruri* (Euphorbiaceae) leaf extract is one such herbal medication now being investigated in this research, particularly for its anti-inflammatory and anti-ulcerogenic capabilities in an animal model. *Phyllanthus niruri* inhabits the tropical areas of Asia and America. [12], [13]. The plant is used to treat dysentery, influenza, vaginitis, tumours, diabetes, jaundice, dyspepsia, and other conditions. The plant extracts have also been proven to have antiviral and antibacterial properties. Indigenous women have also utilised the plant to alleviate menstruation and uterine problems. Many active phytochemicals have been discovered in *Phyllanthus niruri* including flavonoids, alkaloids, terpenoids, lignin, polyphenols, tannins, coumarins, and saponins. Numerous preclinical investigations have shown that preparations of this plant have medicinal properties [14]. According to a recent research [15], the aerial component of this plant has anti-inflammatory effects. Furthermore, it has been discovered that *Phyllanthus niruri* leaves have a high concentration of flavonoids and polyphenols, both of which have anti-ulcer properties. However, there were no reports on the anti-inflammatory and anti-ulcer properties of P. Niruri from Nigerian species, prompting this study to assess the phytochemical screening of *Phyllanthus niruri* leaves for ulcer therapy [16].

MATERIALS AND METHODS

Sample Collection

Fresh leaves of *Phyllanthus niruri* L. (Euphorbiaceae) were picked from Yola metropolis in Adamawa State and transported to Biology Laboratory of the Department of Science Laboratory Technology, Federal Polytechnic, Mubi, for authenticity. Fresh leaves of *Phyllanthus niruri* L. (Euphorbiaceae) were taken from Yola city in Adamawa State and sent to the Biology Laboratory of the Department of Science Laboratory Technology, Federal Polytechnic, Mubi, for identification.

Extraction procedure

Fresh P. Niruri leaves were washed and dried in an oven set to 45 degrees Celsius. The dry material was ground into a coarse powder using a grinder. To extract the phytochemicals, about 200 g of coarse powder was steeped in 95% methanol in a 500 ml conical flask, filled with cotton, and sealed with aluminium foil for seven days with periodic stirring [17]. The preparation was then filtered, and the filtrate was collected for extraction. A rotary evaporator was used to decrease the filtrate, which was then stored in an open area of the laboratory for five days to allow the residual solvent to evaporate. [18].

Carbohydrate Test (Mollisch's test)

To 2 ml of extract, add 2-3 drops of alpha naphthol solution in alcohol and mix for 2 minutes. 1ml of strong sulphuric acid was progressively added from the sides of the test tube. A rich violet hue in the interphase between two layers suggested the presence of carbohydrates [18].

Saponin (Froth) test

The methanol extract (50 mg) was diluted with distilled water to yield 20ml. The suspension was shaken in a graduated cylinder for 15 minutes. Persistent foam suggested the presence of saponins [18].

Dragendorff's Alkaloid Test

The plant's methanol extract (6g.) was diluted in 10ml of distilled water, followed by 2 ml of hydrochloric acid until acidified, Dragendorff's reagent (2 ml), and an orange-red precipitate indicating the presence of alkaloids [18]. To detect glycosides using Borntrager's test, 50mg of methanol extract was hydrolysed with concentrated hydrochloric acid for 2 hours on a water bath. The filtered hydrolysate (4 ml) was then placed in a test tube and shaken with 6 ml of chloroform. The chloroform layer was separated, and a 10% ammonia solution was added to it. The pink hue showed the presence of glycosides [18].

Test for steroids/terpenes (Hoss' response)

In this test, 20 mg of methanol extract was dissolved in 2 ml of chloroform, then concentrated sulphuric acid was poured from the test tube's side. The hue of the ring at the intersection of the two layers was observed. A violet green colour suggested the presence of cholesterol, or sitosterol. A crimson hue ring indicated the presence of sterols and terpenes [18].

Shinoda test for flavonoids

To the dry methanol extract (30 mg), 2ml of ethanol was added, followed by a little piece of magnesium ribbon. The dropwise addition of concentrated HCl results in the production of colours ranging from orange to red, which will demonstrate the presence of flavonoids [19].

Test for phenols and tannins (Ferric Chloride test)

The extract (20 mg) was mixed with 2 ml of 1% ferric chloride solution; a purple or red hue indicated the presence of phenols. One to two millilitres of methanol extract and a few drops of 5% aqueous ferric chloride solution were combined. A bluish-black colour was generated, which faded with the addition of a few ml of weak sulphuric acid, followed by the production of a yellowish-brown precipitate suggesting the presence of tannins [20].

Test for Anthraquinones (Borntrager test)

3ml of extract, 3ml of benzene, and 5ml of 10% ammonia solution were added and mixed well. The emergence of a pink, crimson, or violet hue in the ammoniacal (lower) phase indicates the existence of free anthraquinones [20].

RESULTS AND DISCUSSION

The findings of the Phytochemical Screening of P Niruri are shown in table 1 below; the plant demonstrated excellent phytochemical components and may be considered a therapeutic plant and a source of nutrition.

Table I: Phytochemical Components of the Leaf Extract of *Phyllanthus niruri*

S/NO	TEST	OBSERVATION
1	Carbohydrate	+
2	Saponin	-
3	Alkaloids	+
4	Glycosides	-
5	Steriods	+
6	Flavonoids	+
7	Tennins	+
8	Anthraquinones	+

The phytochemical analysis confirmed the presence of alkaloids (red colour), flavonoids, and tannins (pink colour for flavonoids, blackish precipitate for tannins). A strong violet tint at the interphase between two layers suggested the presence of carbohydrates. More specifically, a violet-green colour indicated the presence of cholesterol, sitosterol. A crimson ring indicated the presence of sterols/terpenes. Anthraquinones were further verified by the emergence of a pink hue in the ammoniacal (lower) phase, which indicates the presence of free anthraquinones [18]. The presence of these phytochemical components may account for the plant leaf extract's antibacterial action. Flavonoids have also been shown to offer larger potential advantages for human health. P Nuriri, a medicinal herb, is historically used to cure ulcers. The antibacterial activity of the extracts has been linked to the presence of several active components [17].

CONCLUSION

The study validates the traditional medicinal use of *Phyllanthus niruri* and reveals that its extracts possess potent bioactive compounds with broad-spectrum therapeutic potential. These include antimicrobial, analgesic, antifungal, anti-inflammatory, anticancer, antifertility, antispasmodic, and hepatoprotective properties. The extract also shows

promise in managing conditions such as syphilis, ulcers, arthritis, eye diseases, wounds, chronic fever, and nausea. These findings support the potential application of *Phyllanthus niruri* in developing novel, plant-based antibacterial and multi-target therapeutic agents.

RECOMMENDATIONS

Further studies on the isolation, characterization, and pharmacological evaluation of this plant are recommended to comprehensively determine its medicinal efficacy.

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