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Qualitative Phytochemical Screening of Phyllanthus niruri and Swertia Plant Extract

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Abstract: *Phytochemicals are non-nutritive, chemical compounds that occur naturally in plants and have diverse protective properties. Most Phytochemicals like carotenoids, flavonoids, and polyphenols have antimicrobial activity and serve as a source of antimicrobial agents and also shows potential anticancer activity. In the present study, two indigenous plants of Chhattisgarh namely Phyllanthus niruri and Swertia were analyzed for various Phytochemicals present.*

Key Word: *Phytochemicals, Phyllanthus niruri, Swertia, antimicrobial agents.*

I.INTRODUCTION

We are fully aware of the value of plants. The plant kingdom is a treasure trove of potential medications, and there has been a growing understanding of the relevance of medicinal plants in recent years. Plant-based drugs are widely available, less priced, safe, and efficient, with few adverse effects. Plants that have been chosen for medical use over thousands of years are the most apparent choice when investigating the present quest for therapeutically effective novel medications such as anticancer agents, antibacterial drugs, and antimicrobial substances [1]. According to the World Health Organization (WHO), medicinal plants are the best source of a wide range of medications. Approximately 80% of people in industrialized nations utilize traditional medicines, which contain substances derived from medicinal plants. Such plants, however, should be researched to better understand their features, safety, and efficiency [2].

Plants create substances that are known as phytochemicals. These are created by the primary and secondary metabolisms of the plant. These phytochemicals are necessary for plants to survive or to fend off other plants, animals, insects, and microbial pests and diseases [3]. They also benefit plants and protect them from illness and damage caused by environmental threats including pollution, UV, stress, and drought. They have been employed as traditional medicine and as poisons since ancient times [4].

According to World Health Organization (WHO) research, more than 80% of people in underdeveloped countries rely on traditional medicines derived from plants for their primary health care. The use of traditional medicines in the manufacture of modern medical preparations is essential, and so 'Phytomedicines serve as a bridge between traditional and modern medicine. In many underdeveloped nations, medicinal plants play a vital role in the health of individuals and communities. Medicinal herbs are thought to be safer and are used to cure a variety of diseases [5].

Plants offer the fundamental elements required for animals and human growth, such as proteins, carbs, lipids, vitamins, and minerals. Both primary and secondary metabolites are the most common types of phytochemicals. Sugars, amino acids, proteins, nucleic acids, chlorophyll, and other fundamental metabolites are important for the basic growth of the plant [6]. Secondary metabolites are those that are required for plant survival in severe environments. Secondary metabolites such as flavonoids, tannins, saponins, alkaloids, steroids, and phytosterols have been discovered to have various commercial applications such as coloring agents, pharmaceuticals as flavoring agents, insecticides, pesticides, anti-bacterial and antifungal goods [7]. Furthermore, they can be utilized to protect people from a variety of ailments such as cancer, diabetes, cardiovascular disease, arthritis, and aging, among others [8].

Plant products have been used in phytomedicines since the dawn of mankind. Barks, leaves, flowers, roots, fruits, and seeds may all be used to make this. Knowledge of plant chemical ingredients is desirable because such knowledge will be useful in the production of complex chemical compounds [9].

The main objective of our research work was to analyze the presence or absence of different phytochemicals in the selected two medicinal plants from the Jangda region (Chhattisgarh, India) used for healing and curing various diseases.

II.MATERIAL AND METHODS

SELECTION AND COLLECTION OF PLANT MATERIAL

Two different natural plants were selected for the synthesis of the silver nanoparticles. The plant parts of ***Phyllanthus niruri*** and ***Swertia*** were collected in January 2020 from various places in Jangda village in Chhattisgarh, and the plant parts were validated by an expert. The plant components were cleaned with distilled water to remove the dust and dried at room temperature (20-25° C) for 12 days before being ground into a powder with a household blender and stored in an airtight glass jar until needed [10].

(A) **(B)**

Figure no 1 Plants images of (A) *Swertia* (B) *Phyllanthus niruri*

- **Preparation of Extract**

Ethanolic extracts were prepared by the following procedure: The coarse powder of *Swertia* stems and Phyllanthus niruri leaves were weighed out (10 gm) and steeped in 200 ml of ethanol in a conical flask. The mixture was then aggressively stirred with a glass rod to ensure adequate extraction. At room temperature, the mixture was given 24 hours to settle. After filtering the extracts via Whatman no. 1 filter paper, they were employed in additional tests [11].

- **Phytochemical analysis**

Chemical tests for the screening and identification of bioactive chemical constituents in the medicinal plants under study were carried out in extracts as well as powder specimens using standard procedures [12].

QUALITATIVE ANALYSIS OF PRIMARY METABOLITES

- **Amino acids test**

A test for amino acids is performed on the filtrate after the extract (100 mg) has been dissolved in 10 ml of distilled water and run through Whatman No. 1 filter paper.

- **Ninhydrin test**

To 2 ml of aqueous filtrate, two drops of ninhydrin solution (10 mg of ninhydrin in 200 ml of acetone) are added. The presence of amino acids is shown by the color purple.

- **carbohydrate Test**

Molish test

2 drops of an alcoholic solution of -naphthol are added to 2 ml of plant extract. A few drops of strong H_2SO_4 are progressively added along the test tube's sides after the liquid has been well agitated. Carbohydrates are indicated by the presence of a violet ring.

- **Fatty acid test.**

5 ml of ether was combined with 1 ml of the extract. On a filter paper, the extracts were allowed to evaporate before the paper was dried. The presence of fatty oils is indicated by transparency.

- **Starch test**

0.01 g of iodine and 0.075 g of KI were added to approximately 5 ml of distilled water, and this solution was then added to approximately 2-3 ml of the extract. Blue color formation shows the presence of starch

- **Protein test**

A 0.5% conc. HNO_3 solution was added to 2ml of extract after it had been combined with 2ml of water. Yellow coloration is a sign that proteins are present.

QUALITATIVE ANALYSIS OF SECONDARY METABOLITES

- **Test for Alkaloids**

Mayer's test

2 drops of Mayer's reagent are applied along the test tube's sidewalls to a few ml of extract. Alkaloids are present when a white, creamy precipitate appears.

- **Anthraquinones test**

A few ml of conc. H_2SO_4 and one ml of diluted ammonia was added to five ml of extract. The existence of anthraquinones is confirmed by the appearance of rose pink.

- **Quinones test**

Alcoholic KOH is added to 1ml of extract; the presence of red to blue color suggests quinines.

- **Glycosides test**

The development of blue color is indicative of glycosides when 2 ml of extract is combined with about 0.4 ml of glacial acetic acid that contains traces of $FeCl_3$ and 0.5 ml of conc. H_2SO_4.

- **Test for phenol**

Gelatine test

2ml of a 1% solution of gelatine containing 10% NaCl is added to 5ml of extract. The presence of phenol is indicated by the presence of a white precipitate.

- **Polyphenol test**

3ml of a 0.1% gelatine solution was added to the 5ml of ethanolic extract. Polyphenols were present in the precipitate during its production.

- **Tannins test**

A few drops of $FeCl_3$ solutions were added to 5 ml of the extract, and when the dark green color appeared, tannins were present.

- **Flavonoid test**

10% ammonia solution is boiled and added to the extracts' aqueous solution. Flavonoids are present when fluorescence yellow is produced.

- **Phytosterol test**

When 2 drops of conc. H_2SO_4 is added to the extract after it has been dissolved in 2 ml of $(CH_3CO)_2O$, a variety of color changes along the sides indicate the presence of phytosterols.

- **Saponins test**

A few ml of distilled water was vigorously shaken with 0.5 mg of extract. For saponins, the development of foaming is favorable.

- **Steroid test**

When 2 ml of the extract is combined with 2 ml of conc H_2SO_4 and 2 ml of $CHCl_3$, the presence of steroids is shown by the emergence of red color and yellowish-green fluorescence.

- **Xanthoprotein test**

A few drops of HNO_3 and NH_3 are added to 1 ml of the extract. The presence of xanthoproteins is indicated by a reddish-brown precipitate.

- **Anthocyanin test**

The presence of anthocyanins is shown by the transformation of pink-red to blue-violet in 2 ml of an aqueous extract with the addition of 2N HCl and NH_3.

QUALITATIVE ANALYSIS OF VITAMINS

- **Test for Vitamin – A**

In 5 ml of chloroform, 250mg of the powdered sample is dissolved and it is filtered, to the filtrate, and 5 ml of antimony trichloride solution is added. The appearance of transient blue color indicates the presence of vitamin-A

- **Test for vitamin – C**

In 5ml of distilled water, 1ml of the sample was diluted and a drop of 5% sodium nitroprusside and 2ml of NaOH is added. A few drops of HCl are added dropwise, the yellow color turns blue. This indicates the presence of vitamin- C

➢ **Test for vitamin – D**

In 10 ml of chloroform, 500mg of the powdered extract is dissolved and filtered. 10ml of antimony trichloride is added, the appearance of pinkish-red color indicates the presence of vitamin – D

➢ **Test for vitamin – E**

Ethanoic extract of the sample was made and filtered (500mg in 10ml), a few drops of 0.1% ferric chloride were added and 1ml of 0.25% of 2'- 2'dipyridyl was added to 1ml of the filtrate. The bright-red color was formed with a white background.

III. RESULT

Phytochemical Screening of *Swertia* Stems extract

The result of the phytochemical screening of ethanolic extract of *Swertia* stem was obtained as follows**:**

Table no 1 Phytochemical Screening of Primary and Secondary Metabolites

	Observation	
Primary Metabolites	**Fatty acid**	**-**
	Starch	**+**
	Proteins	**-**
	Amino acid	**-**
	Carbohydrate	**+**
Secondary Metabolites	**Alkaloids**	**-**
	Anthraquinones	**-**
	Glycosides	**+**
	Phenol	**+**
	Polyphenol	**+**
	Tannins	**-**
	Flavonoids	**+**
	Steroids	**+**
	Xanthoproteic	**-**
	Saponins	**+**

(+) Positive → Presence

(-) Negative → Absence

Table no 2 Screening of Vitamins

S.No.	Observation	
1.	**Vitamin A**	**+**
2.	**Vitamin C**	**-**
3.	**Vitamin D**	**+**
4.	**Vitamin E**	**+**

(+) Positive → Presence

(-) Negative → Absence

Phytochemical Screening of *Phyllanthus niruri* leaves extract

The result of the phytochemical screening of the ethanolic extract of *Phyllanthus niruri* leaves extract was obtained as follows**:**

Table no 3 Phytochemical Screening of Primary and Secondary Metabolites

	Observation	
Primary Metabolites	**Fatty acid**	**-**
	Starch	**+**
	Proteins	**-**
	Amino acid	**-**
	Carbohydrate	**-**
Secondary Metabolites	**Alkaloids**	**-**
	Anthraquinones	**+**
	Glycosides	**-**
	Phenol	**+**
	Polyphenol	**+**
	Tannins	**-**
	Flavonoids	**+**
	Steroids	**+**
	Xanthoproteic	**-**
	Anthocyanins	**-**
	Saponins	**+**

(+) Positive → Presence

(-) Negative → Absence

Table no 4 Screening of Vitamins

S.No.	Observation	
1.	**Vitamin A**	**-**
2.	**Vitamin C**	**+**
3.	**Vitamin D**	**+**
4.	**Vitamin E**	**+**

(+) Positive → Presence

(-) Negative → Absence

IV. DISCUSSION

Plant samples were subjected to phytochemical analysis, which identified components known to have physiological and therapeutic effects. The phytochemicals phenols, tannins, flavonoids, saponins, glycosides, steroids, terpenoids, and alkaloids were found in the plant extracts after analysis. One of the biggest and most common families of plant metabolites is the phenolic chemicals. They have biological qualities that include prevention of angiogenesis and cell proliferation, as well as anti-apoptosis, anti-aging, anti-carcinogen, anti-inflammation, and anti-atherosclerosis [13]. They also protect the cardiovascular system. Natural antioxidants mainly come from plants in the form of phenolic compounds such as flavonoids, phenolic acids, tocopherols, etc. Flavonoids are hydroxylated phenolic substances known to be synthesized by plants in response to microbial infection and they are antimicrobial substances against a wide array of microorganisms in vitro. Their activity is probably due to their ability to complex with extracellular and soluble proteins and to complex with the bacterial cell wall. They also are effective antioxidants and show strong anticancer activities [14].

V.CONCLUSION

Consequently, the chosen plant sample's phytochemical profile was checked. According to the study, plants are a wonderful source of phytochemicals that may be used to treat a variety of diseases. The phytoconstituents that were abundant in plants were saponins, flavonoid, steroid, glycoside, vitamin E and vitamin D etc. To determine the numerous phytoconstituents found in plant extracts, phytochemical screening was crucial. The growth was modestly hampered by phytochemicals in the aqueous extract. This work made it possible to understand how plant extracts' phytoconstituents lethally affect live cells [15].

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