Study The Cymbopogon Flexuosus (Sp.-Krishna), Centella Asiatica And Cynodon Dactylon Phytochemical Analysis

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ABSTRACT
The vast number of medicinal uses for naturally occurring chemicals has shifted the emphasis of scientific inquiry toward the study of molecules produced from plants. Three unique plant species, *Cymbopogon flexuosus(krishna), Centella asiatica, and Cynodon dactylon*, are analyzed in this research for their phytochemical content. These species are known for their bioactive chemicals and traditional medicinal usage. In order to better understand these plants and their possible medicinal uses, a thorough analysis is being conducted to identify their phytochemical components.

Keywords: Phytochemical, *Cymbopogon flexuosus(krishna), Centella asiatica, Cynodon dactylon*.

1. INTRODUCTION

The distinctive citrus aroma of *Cymbopogon flexuosus(krishna)*, more often known as East Indian Lemongrass, is what makes it stand out. The essential oils of this plant include a high concentration of the versatile chemicals citronella, geraniol, and limonene. [1,2] Beyond its olfactory appeal, citronella shows potential antibacterial properties, adding to its fame as a natural insect repellent. Geraniol, a component of this grass species, has antioxidant and anti-inflammatory capabilities in addition to its pleasant aroma. [3,4] *Cymbopogon flexuosus(krishna)* is a treasure trove of compounds that promote health, including the antioxidant limonene, which is plentiful in citrus fruits. To better understand the antibacterial, anti-inflammatory, and antioxidant functions of these volatile chemicals, phytochemical research is continuing to decipher their complex makeup. Natural product development in the pharmaceutical and cosmetic industries may be bolstered by this expertise, which also expands our understanding of traditional usage. [5,6]

Traditional medicine in many different cultures makes extensive use of *Centella asiatica*, most commonly known as *Gotu Kola*. The therapeutic value of this herb is enhanced by the presence of triterpenoid saponins, flavonoids, and asiaticoside. [7,8] The neuroprotective characteristics of triterpenoid saponins, such as asiaticoside, suggest that they may have the ability to improve cognitive function. [9] *Centella asiatica* is a dermatological superhero because to flavonoids, which have potent antioxidant effects and are essential to the plant's skin-regenerative capabilities. Investigating the functions of these phytochemicals in neuroprotection, wound healing, and antioxidant defense is a continuing endeavor. [10] The potential of Asiaticoside to promote collagen production opens up new avenues for its use in dermatology, providing safe, all-natural options for skin care products. *Centella asiatica* has the potential to be used therapeutically in neurology, dermatology, and general health if its complex phytochemical composition can be better understood.[11]

The strong grass species *Cynodon dactylon*, more often known as *Bermuda grass*, has a long and storied history of traditional medical usage. The most important phytochemical components are tannins, alkaloids, and flavonoids, all of which show potential for various pharmacological actions. [12,13] The therapeutic effects of this grass may be due in large part to the alkaloids it contains, which are known to have a wide range of biological functions. The health advantages of *Cynodon dactylon* are enhanced by the presence of flavonoids, which have antioxidant properties and fight against oxidative stress. Tannins, which have anti-inflammatory and astringent properties, complete the pharmacological profile of the plant. Phytochemical research is continuing in an effort to discover these chemicals' medicinal potential, with a focus on their anti-inflammatory and antioxidant properties. Exploring the alkaloids found in *Cynodon dactylon* might lead to the discovery of new bioactive chemicals that have therapeutic potential, thereby increasing the arsenal of natural substances used in medicine.[14]

A comparison of the phytochemical profiles of *Cynodon dactylon, Centella asiatica, and Cymbopogon flexuosus(krishna)* reveals a mosaic of their respective strengths and possible synergies. Even while every plant has its own special blend of chemicals, there may be ways to combine them for even better health. Researchers may use this comparison technique to find the compounds that have the greatest promise for pharmacological, nutraceutical, and cosmeceutical uses, as well as for future inquiry. The project is bridging the gap between traditional and contemporary medicine by delving into the secrets of these botanical miracles and laying the framework for using them to improve human health and wellness. To

achieve this goal, we must find ways to combine traditional wisdom with scientific understanding of these plants so that we may fully use them as resources for human health. [15]

2. METHODOLOGY

"We obtained the fresh aerial parts of three different plant species from the lush fields of Ambikapur, which is situated in the tranquil Surguja district of Chhattisgarh: *Cymbopogon flexuosus*, also called *Krishna*; *Centella asiatica*, also called *Brahmi*; and *Cynodon dactylon*, also called *Doob Grass*. These carefully chosen plant materials would function as the basic components of the research we have planned.

After gathering these essential materials, we started getting them ready for the next study. To preserve their original essence and characteristics, the leaves of these plants were carefully allowed to air dry. Then, to make sure the dried leaves were prepared for use in our scientific endeavors, they were ground into a fine powder.

We took the precaution of keeping our powdered samples in an airtight container to protect their efficacy and integrity. Until it was needed for our scientific research, the plant material was kept in its perfect condition in this hermetically sealed container that acted as a protective vault. The integrity and dependability of our study materials were preserved in large part by this careful management of our botanical resources."

The first phase was carefully inspecting the plant samples taken from *Cymbopogon flexuosus (Krishna), Centella asiatica,* and *Cynodon dactylon* for any indications of infection, spores, damage, discoloration, or deformation. After that, unharmed leaf samples underwent a comprehensive cleaning procedure that included rinsing with deionized water after being washed with tap water. The leaves were then meticulously air-dried at 37°C in a room with ambient conditions. To make the leaves ready for further examination, the midribs were cut off.

The fruit and leaves were carefully crushed using a crusher and pestle in order to extract the advantageous chemicals. The four samples were then mixed with deionized water, keeping the specimen-to-deionized water ratio at 1:5, after being taken from several Ficus religiosa trees.

To make the extracts more readable, different samples were strained through Whatman No. 1 filter paper in different test tubes. Some samples were centrifuged in order to improve the quality of the filtering. Centrifugation was used on certain extracts in order to produce a filtrate that was more purified. While the leftover extract was further diluted, filtered, and saved for a later phytochemical examination, a part was kept in Eppendorf tubes at 4°C for future research.

Phytochemical screening and proximate analysis of the plant material were carried out in a systematic and exhaustive manner using a number of recognised methodologies and techniques. For a complete understanding of the plant material's chemical composition and nutritional value, these analytical methods were crucial. It was qualitatively determined the presence of several phytochemicals in the *Cymbopogon flexousus Sp. - krishna, Centella asiatica,* and *Cynodon dactylon* extracts.

- **Reagents for phytochemical analysis**

1. Mayer's reagent: Two parts, potassium iodide and mercuric chloride, make up the reagent. Ten millilitres of a solution containing five grammes of potassium iodide was combined with sixty millilitres of a solution containing one and a third grammes of mercuric chloride. In order to prepare the Mayer's reagent, the total volume was brought to 100 ml.

2. Fehling's solution: A two-part solution is provided.

Fehling's solution A: A solution of 6.9 grammes of copper sulphate in 100 millilitres of water was prepared.

Fehling's solution B: A 100 ml solution of Fehling's solution B was prepared by mixing 10 g of sodium hydroxide and 34.6 g of potassium sodium tartrate.

3. Molisch's reagent: In order to get ready Roughly one hundred millilitres of dye 100 millilitres of 95% ethanol diluted with 10 grammes of α-naphthol.

4. Folin-Ciocalteu reagent: For sale the test used diluted Folin-Ciocalteu.

5. Wagner's reagent: In order to get ready Wagner's reagent, 100 millilitres To dissolve 1.27 grammes of iodine and 2 grammes of potassium iodide, 100 millilitres of pure water were used.

6. Salkowski Test: After the correct mixing, 1 milligramme of extract was dissolved in 2 millilitres of chloroform. A gradual addition of concentrated H_2SO_4 was made to the test tube. If the extract became crimson, it meant that steroids were present.

7. Test for flavanoid estimation

Alkaline reagent test: A solution of sodium hydroxide, diluted to 1 mg/ml, was added to the mixture. The presence of flavonoids is indicated by the reaction's yellow colour development.

Lead acetate test: The presence of flavonoids was confirmed by the production of a white precipitate when 1 mg/ml of the extract was treated with lead acetate.

8. Test for phenolic compounds estimation

Lead acetate test: To a few drops of 1% lead acetate, 2 millilitres of the extract was added. The presence of tannins was shown by a yellow precipitate.

9. Test for saponin estimation

Foam Test: The two millilitres of extract (1 milligrammes per millilitre) was well combined with water. The presence of saponins in the extracts was shown by the development of foam.

10. Test for glycosides estimation

Glacial Acetic Acid (Keller-kiliani test): The volume of the sample and the particular methodology determine the quantity of glacial acetic acid that may be used. It is usually employed in modest quantities, and its concentration may be changed according to the reaction or hydrolysis process's needs. There was a dissolution of 1 mg of plant extract in 5 ml of chloroform. A few drops of concentrated hydrochloric acid and $FeCl_3$ were added to the same test tube. Glycosides were detected when a brown ring formed.

11. Test for carbohydrate estimation

Fehling's test: Boiling Fehling's solutions A and B was done after adding 1 millilitre each to 2 millilitres of plant extract. The presence of carbohydrates was indicated by the solution becoming brick red in colour.

12. Test for Amino Acid estimation

Ninhydrin Test: A 2 ml solution of ninhydrin was added to 1 ml of extract. Amino acids were present in the extract, as evidenced by the purple hue.

- **Statistical Analysis**

Every experiment's data was run via a one-way analysis of variance (ANOVA), which was followed by post hoc analysis. The Bonferroni post hoc test is used after the two-way ANOVA and Tukey's multiple comparison test. Software called Graph Pad Prism 6.0 was used to do the analysis.

3. RESULTS

- **Phytochemical Analysis of *Cymbopogon flexousus(krishna)***

A variety of phytochemicals, including tannins, flavonoids, alkaloids, and others, were detected in the ethanolic and aqueous extracts of *Cymbopogon flexousus(krishna)* leaves during the preliminary qualitative phytochemical screening that was used to select the plants for the subsequent experiments.

Table 1: Class of plant compounds found in *Cymbopogon flexousus(krishna)* juice.

Phytochemicals	Test Name	Ethanol extract of Leaves	Aqueous extract of leaves
Tannins	Lead acetate test	+ve	+ve
Alkaloids	Wagner's reagent test	+ve	+ve
Flavonoids	Alkaline reagent test	+ve	+ve
	H_2SO_4 test	-ve	-ve
	Lead acetate test	+ve	+ve
Terpenoids	Salkowski test	-ve	-ve
Saponins	Frothing test	+ve	+ve
Glycosides	Keller kiliani test	+ve	+ve
Coumarins	Sodium chloride test	-ve	-ve

Understanding the phytochemicals in plant extracts is the first step in determining their worth. The phytochemical investigation of *Cymbopogon flexousus(krishna)*leaf extract yielded promising findings for glycosides, saponins, tannins, and flavonoids. Protecting the body against allergies, inflammation, bacteria, viruses, and more, flavonoids are antioxidants by nature. There are several applications for these bioactive components, including syrups, decoctions, essential oils, and more. The work of Sahu, M., et al. (2014). Flavonoids have the added benefit of preventing the oxidation of low density lipoproteins. It may alleviate symptoms of asthma, eczema, and hey. Nevertheless, terpenoids and coumarins are absent from *Cymbopogon flexousus(krishna)* extracts. The antioxidant and antibacterial properties of the extracts examined in this investigation might be attributed to the presence of these phytochemicals.

The aqueous extract of Ipomoea aquatica included 51.36% water, 42.18% carbohydrates, 1.70% protein, 2.75% ash, 1.20% fibre, and 0.81% fat, according to research by Igwenyi et al. (2011). *Cymbopogon flexousus(krishna)* extract is rich in calcium, iron, and magnesium. The phytochemical content of the extracts was also examined, and it was found that Ipomoea aquatica had a lot of flavonoids and alkaloids and very little steroids and phenols. These nutrients—carbohydrates, vitamins, and minerals—are great for both humans and animals. In a study conducted by Huang, D. J. et.al. (2005), four distinct extract fractions were examined for total phenolic compounds. The results showed that the stem extract had the highest concentration of phenolics, followed by the ethanol extract of leaves, and the lowest concentration was observed in the aqueous leaf extract.

Leaf ethanol extract had the greatest flavonoid concentration, followed by stem ethanol extract, according to the same research. The phytochemicals in an ethanol extract of *Cymbopogon flexousus(krishna)* leaves and stems were examined by Singh, P. K. et al. (2016), who also found a significant content of sugar, protein, carotenoids, phenolics, and flavonoids. The beneficial therapeutic effects of the extract are due to the high concentration of these phytochemicals. Dewanjee et al. (2017) found that methanolic and ethanolic extracts of *Cymbopogon flexousus(krishna)* leaves contained phenolics such as ellagic acid, gallic acid, and chlorogenic acid as well as flavonoids such as naringenin, myricetin, quercetin, and apigenin. The phytochemical composition of an extract might vary from study to study, even within the same research, depending on factors such as the extraction method and the specific geographic region. Plant secondary metabolite synthesis is influenced by a number of factors, including the drying method and the season of sample. Researchers Padmavathy, A. et al. (2017) identified alkaloids, flavonoids, and saponins in both the methanolic and ethanolic extracts

of *Cymbopogon flexousus(krishna)*, as well as other phytochemicals. Extracts may have antibacterial properties due to flavonoids and alkaloids.

- **Phytochemical analysis of *Centella asiatica* (L)**

The presence of several phytochemicals in the aqueous extracts of *Centella asiatica (L)* was verified by various experiments. Based on the findings, it seems that *Centella asiatica (L)* aqueous leaf extract contains carbohydrates, tannins, coumarins, and flavonoids. The principal phytochemicals in the water-based stem extract, however, are carbohydrates and flavonoids. The presence of carbohydrates, tannins, coumarins, and flavonoids was also shown by phytochemical analysis in the aqueous extract of *Centella asiatica (L)* roots. None of the extracts included any additional phytochemicals, including steroids, terpenoids, glycosides, or amino acids.

Table 2: Group of phytochemicals present in *Centella asiatica* (L)extracts

Phytochemicals	**Name of the test**	**Aqueous extract Leaves**
Steroids	Salkowski Test	-ve
Alkaloids	Wagner's reagent test	+ve
Terpenoids	Salkowski Test	-ve
Flavonoids	Alkaline ReagentTest	+ve
	H_2SO_4 Test	+ve
	Lead acetate Test	+ve
Tannins	Lead acetate Test	+ve
Glycosides	Keller-Kiliani Test	-ve
Coumarins test	Sodium chloride test	+ve
Carbohydrates	Benedict's Test	-ve
	Fehling's Test	+ve
Proteins	Xanthoproteic Test	-ve
Amino acids	Ninhydrin Test	-ve

Finding bioactive components in plants, such as alkaloids, phenolic compounds, tannins, and flavonoids, requires preliminary phytochemical screening. Drug research and development are facilitated by the identification of these active components. The findings clearly show that the aqueous leaf extracts of *Centella asiatica (L)* include phytochemicals such as carbohydrates, tannins, coumarins, and flavonoids. On the other hand, the primary phytochemicals found in the water-based stem extract include carbohydrates and flavonoids. As a defence mechanism against harmful organisms, plants create a number of secondary metabolite molecules. *Centella asiatica (L)* leaves were subjected to phytochemical screening by Jayaprakash, S. B., and Nagarajan, N. (2016), who then extracted the phytochemicals using petroleum ether, acetone, and methanol. According to their findings, all three extracts included alkaloids and flavonoids. But acetone and methanol extracts don't contain any steroids, tannins, or saponins.

- **Phytochemical analysis of *Cynodon dactylon***

The presence of tannin, flavonoid, alkaloids, glycosides, and coumarin was verified by phytochemical analysis in the aqueous extract of *Cynodon dactylon L.* leaves. The findings also hinted to the possible absence of additional phytochemicals, such as terpenoids and steroids, from the extract.

Table 3: Phytochemical complex found in *Cynodon dactylon* water-based extract.

Phytochemicals	**Name of the Test**	**Aqueous extract of leaves**
Steroids	Salkowski test	-ve
Alkaloids	Wagner's reagent test	+ve
Terpenoids	Salkowski test	-ve
Flavonoids	Alkaline reagent test	+ve
	H_2SO_4 test	-ve
	Lead acetate test	-ve
Tannins	Lead acetate test	+ve
Glycosides	Keller-Kiliani test	+ve
Coumarins	Sodium chloride test	+ve

Both the water and ethanolic extracts of the complete *Cynodon dactylon* plant showed evidence of terpenoids, tannin, flavonoids, steroids, and coumarins. The findings also indicated that none of the *Cynodon dactylon* extracts contained any glycosides or other phytochemicals. Another study that looked at secondary metabolites in Oldenlandia corymbosa L. extract was by Yadav, R. N. S., and Agarwala, M. (2011). They discovered that the extract has 11.6 mg/gm of phenolic content and 4.4 mg/gm of flavonoid. The ethanolic extract of the leaves included steroids, flavonoids, alkaloids, and

glycosides, according to Maji, H. S. et al. (2011). The extract was found to include proteins, carbs, tannins, flavonoids, saponins, steroids, terpenoids, glycosides, and phenols, according to Noiarsa, P. et al. (2008). Rajagopal, P. L., et al. (2018) conducted preliminary phytochemical research of the plant's alcoholic fractions and verified the presence of alkaloids, glycosides, flavonoids, carbohydrates, and phenolic substances. In a study conducted by Sahu A.K., et al. (2020), the components of the leaves were extracted using petroleum ether and an aqueous extract. The researchers then conducted phytochemical screening on the extract and discovered that it contained various plant constituents such as alkaloids, glycosides, saponins, anthraquinone, and terpenoids. However, they did not find any carbohydrate, phenolic, or flavonoid compounds.

4. CONCLUSION

A number of different tests, including those with lead acetate, hydrochloric acid, sodium chloride, Frothing, and Salkowski Methods such as the Killer kiliani test were used in order to investigate the phytochemicals that were discovered in a variety of extracts. Hyaluronic acid and an extract of *Cymbopogon* species that is water-based is used. Both flavonoids and tannins, as well as coumarins and carbohydrates, were discovered in the water-based extract of the leaf of *Centella asiatica (L)*. The aqueous extract of *Centella asiatica*, on the other hand, was found to have terpenoids, tannin, flavonoids, steroids, and coumarins. Furthermore, the ethanol extract of *Cynodon dactylon* whole plant leaves was found to contain tannins, flavonoids, glycosides, and saponins—these compounds were proven to be present.

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