

Phytochemical screening of the Herbal Formulation of *Morinda citrifolia* and *Costus afer* Leaf Extracts

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Abstract

Medicinal plants not only supplement or replace the frequently insufficiently available modern medical treatments but also improve the local population's health and security. As a result, these plants are essential to daily life and have strong ties to a wide range of social, cultural, and economic events related to birth, growth, aging, illness, and death. The formulation of *Morinda citrifolia* and *Costus afer* undergoing phytochemical screening in methanol extract. The phytoconstituents discovered in the formulation were tannin, terpenoid, flavonoid, alkaloid, cardiac glycoside, glycoside, saponins, etc. The therapeutic value of a medicinal plant is determined by its phytoconstituents, either singly or in combination. Some of the significant phytochemicals with various biological activities include alkaloids, flavonoids, phenolics, tannins, saponins, steroids, glycosides, terpenes, etc. The identification of the phytochemicals can be used to predict the pharmacological activity of a plant. The formulation used in literary works contains phytoconstituents that have been linked to a variety of pharmacological actions. Therefore, these plants may be exploited to create medications that are efficient against diabetes, heart attack, bacteria, and microorganisms as well as cancer cells.

Keywords: health, Medicinal plants, modern medical treatments, phytoconstituents, glycoside.

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INTRODUCTION

The use of herbal medicine to manage or cure diseases dates back to the Stone Age. There has been an advancement in pharmacological discoveries over the years that has resulted in the production of many synthetic drugs. Almost every part of this plant is endowed with medicinal potential in diseases such as malaria, measles, diabetes mellitus, arthritis, and stomach disorders. Secondary metabolites also known as phytochemicals and elements inherent in plants play vital roles in the prevention, treatment, and management of several chronic disease conditions and infections. Plants remain the natural reservoir of bioactive compounds from which drug leads are extracted for therapeutic purposes (Larayetan *et al.*, 2019). Phytochemicals such as saponins, tannins, alkaloids, flavonoids, and cardiac glycosides are natural products that have been shown to possess notable therapeutic properties which include antimicrobial, antiseptic, anti-inflammatory, antioxidant, hypotensive,

antimalarial, anti-carcinogenic-and-anti-mutagenic properties (Sahare and Moon, 2015).

This tremendous interest in plant-derived drugs is mainly due to the current widespread belief that herbal medicine is safer and more reliable than costly orthodox medicine, many of which may have adverse side effects (Jigna *et al.*, 2006). Natural products are however very much available with minimal cost and showing little or no side effects. Compounds high in antioxidant ability are flavonoids and phenols. Trace elements such as copper, manganese, and magnesium also act as antioxidants (Yakubu *et al.*, 2019). Since ancient times, a great variety of plants have been used for therapeutic purposes. Most parts of plants have been used as extracts and may possess anti-inflammatory and antioxidant properties related to diseases such as diabetes, atherosclerosis, neurodegenerative, or cancer (Rodríguez-Yoldi, 2021). Phytochemical screening is the scientific process of analyzing, examining, extracting, experimenting, and thus identifying different

classes of phytoconstituents present in various parts of the base for the discovery of drugs, the active components could be further taken for investigation and research. The process was qualitative which is termed phytochemical screening. The outcome of the research could be fruitful in developing potent drugs against various diseases. Natural compounds of plants have been utilized in the conventional system of medication to cure different infections and disorders. There are many plants whose total medicinal value is even now unknown and *M. citrifolia* and *Costus afer* are among them. Screening active compounds from plants has led to the invention of new medicinal drugs which have efficient protection and treatment roles against various diseases. However, the present study aims at investigating the phytoconstituents present in the formulation of *Morinda citrifolia* and *Costus afer* extract.

MATERIALS AND METHODS

Chemicals/reagents used

All the chemicals used in this study were of analytical grades and products.

Sample Collection and Preparation

Fresh seeds of *Morinda citrifolia* and fresh leaves of *Costus afer* were collected from a farm in Orlu of Imo State Nigeria and were identified and authenticated by a Taxonomist from the University of

the Michael Okpara University of Agriculture Umudike. The seed was sun-dried for seven days and then ground into powder form to increase its surface area.

Extraction Method

During the extraction process, 500g of *Morinda citrifolia* seed powder and *Costus afer* leaf powder was measured and soaked in 1000 ml of methanol for 72hrs. The mixture was filtered. The distillation process was applied to separate the solvent from the extract by evaporating to dryness. The stock solution of the extract was weighed and stored under refrigeration for further study.

Preparation of Herbal formula (TGG)

The TGG herbal formula was prepared with methanol extract of *M. citrifolia* and *Costus afer* in the ratio of 2:2 respectively using a method described by Unegbu *et al.*, (2021).

Phytochemical Analysis

The TGG herbal formula was used for the phytochemical analysis. The phytochemical tests included the test for alkaloids, flavonoids, tannins, saponins, terpenoids, and resins adopting the approach of Ashika *et al* (2018) and Patel & Vakilwala (2016).

RESULTS

Parameters	Sample B1/B2	
	Observation	Remark
Alkaloid Wegners reagent test	++ reddish brown precipitation found	Alkaloid high
Meyers reagent Test	++ precipitation form	High
Flavonoid Ferric chloride	++ black ppt form	High
Lead acetate test	++ precipitate form	High
Tannin acid test	++ red ppt form	High
Lead acetate method	++ black ppt form	High
Resin	- no color formation	Absence
Saponin	++ formation of emulsion	High
cardiac glycoside	+ brick red ppt formed	Low
Terpenoid	+ light reddish brown ppt	Low

DISCUSSION

The varieties of phytochemical components are present in medicinal plants which are possessing beneficial importance in medical sciences, and they are commonly associated with various pharmacological activities of natural products. In this study, the formulation of *M. citrifolia* and *C. afer* exhibited a variety of secondary metabolites such as alkaloids, flavonoids tannins, and saponins which are known to be

responsible for the antioxidant, antimicrobial, antidiabetic, and anticancer activities of the plant (Abuzaid *et al.*, 2020). Free radicals are the major cause of various chronic and degenerative diseases in the living systems. Vast amounts of synthetic molecules are available for free-radical scavenging activity but adverse side effects are associated with these compounds (Poprac *et al.*, 2017). An alternative solution for this persistent global problem is to consume

the naturally available antioxidants from medicinal plants because they have been reported to possess lower side effects and are comparatively safe.

Alkaloids, which are metabolic byproducts formed from amino acids, are one of the primary and most abundant components that plants create (Agidew, 2022). According to the reviews' published articles, alkaloids were extracted from the various plant parts using a variety of solvents, including ethanol, methanol, chloroform, acetone, hexane, petroleum ether, ethyl acetate, and aqueous solutions (water). Using these solvents, medicinal plants' leaves, roots, stem bark, and fruits are extracted of their phytochemical components (Agidew, 2022).

According to published research, flavonoids mostly reduced the risk of cancer and cardiovascular illnesses (Ballard & Marostica, 2019). Flavonoid, alkaloid, and tannin classes of phytochemicals were present, and their presence had a cytotoxic effect (Chowdhury *et al.*, 2017). It was claimed that the flavonoids that give foods their color and aroma have anti-cancer qualities. The presence of saponin is also linked with cytotoxic, anti-bacterial, anti-viral, and cholesterol-lowering activities (Bailly & Vergoten, 2020). Tannin exhibits an anticancer property that can be seen in its growth-inhibitory behavior (Mazni *et al.*, 2016). Plants with a lot of flavonoids may have antibacterial properties (Ballard & Marostica, 2019). Consequently, the phytochemicals validate the assertions that these plants could be used as a source of drugs.

CONCLUSION

Hence, the phytochemical screening of the selected plant sample was done. From the study, it could be concluded that plants are a great source of phytochemicals that could be utilized in curing various ailments. Tannin, terpenoid, flavonoid, alkaloid, cardiac glycoside, glycoside, were the phytoconstituents present abundantly in plants. Phytochemical screening played an important role in identifying various phytoconstituents present in plant extracts. Phytochemicals in the aqueous extract slightly inhibited the growth. This study helped to know the cytotoxic effect of the phytoconstituents present in plant extracts on the living cells. The study provided an important basis for further investigation into the isolation and characterization of phytoconstituents from the formulation for the development of drugs. The study was only based on qualitative analysis and screening. It would be better if a quantitative detection, their bioactivity, and IR spectra of the various phytochemicals could be performed. The study would be more beneficial if the detection, analysis, and separation of the phytoconstituents could be done

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