# **TITLE PAGE**

**PHYTOCHEMICAL SCREENING OF WATER EXTRACTS OF *Telferia occidentalis* (FLUTED GOURD) LEAVES**

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**A PROJECT PROPOSAL SUBMITTED TO THE CONSULTANCY SERVICE AND ACADEMIC MATTER, MUBI CAMPUS, FEDERAL POLYTECHNIC MUBI, ADAMAWA STATE.**

**IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF ORDINARY NATIONAL DIPLOMA (OND) IN SCIENCE LABORATORY TECHNOLOGY**

**SEPTEMBER, 2023**

# **DECLARATION**

We hereby declare that the work in this project titled **“PHYTOCHEMICAL SCREENING OF WATER EXTRACTS OF *Telferia occidentalis* (FLUTED GOURD) LEAVES”** was performed by us under the supervision of Mr. Adamu Isa Baba. The information derived from literatures has been duly acknowledged in the text and a list of references provided. The work embodied in this project is original and had not been submitted in part or in full for any other diploma or certificate of this or any other institution.

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# **APPROVAL PAGE**

This project titled **“PHYTOCHEMICAL SCREENING OF WATER EXTRACTS OF *Telferia occidentalis* (FLUTED GOURD) LEAVES”** meets the regulations governing the award of Ordinary National Diploma (OND) in Science Laboratory Technology, Federal Polytechnic Mubi, Adamawa State

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# **DEDICATION**

We dedicate this project work to our lovely parents for their care support and encouragement throughout our studies.

# **ACKNOWLEDGEMENTS**

We want to acknowledge Almighty God for his infinite mercy and protection throughout our academic activities. And for the understanding in achieving our academic success.

We recognize the effort of our Supervisor Mr. Adamu Isa Baba, who took time, despite his busy schedule to direct and guide us throughout this research work.

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We want to appreciate our parents for their love and care and for giving us the opportunity to be trained and achieve our dreams.

Finally, we appreciate the efforts of our Uncles and aunties, for their encouragement and support throughout the course of our study and also our friends and relatives, course mates and all well-wishers. We love you all, may the Almighty God bless you abundantly, Amen.

# **ABSTRACT**

*The phytochemical screening of water extract of Telferia occidentalis (pumpkin) leaves was carried out using standard methods as described by Davis (1956). The results revealed the presence of the following secondary metabolites; alkaloids, cardiac glycosides, flavonoids, phlobatannins, polyphenols, saponnins, steroids,tannins, and terpenoids). Among the revealed metabolites; alkaloids, flavonoids, phlobatannins and polyphenols were present in both aqueous and methanolic extracts. This finding similar to Akande et al., (2011), who stated that vegetables are rich sources of phytochemicals which have a protective and therapeutic effects essential to prevent diseases and maintaining a state of wellbeing by stimulating enzymes in the liver that render some carcinogents harmless, while free anthraquinones was absent in both aqueous and methanolic extracts. The analysis also revealed the presence of alkaloids, flavonoids, phlobatannins, polyphenols and steroids in the methanolic extract, while the absence of anthraquinones, cardiac glycosides, tannins, terpenoids and saponins were also revealed, similar to Bassey et al., (2022), who also revealed that their absent that they may be attributed to the solubility characteristics of the phytochemicals in the solvent (methanol) used for extraction. Hence, the Telferia occidentalis leaves should be taken by humans because of their medicinal and nutritional value especially by those suffering from anaemia, diabetes and cancer.*

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# **CHAPTER ONE**

# **INTRODUCTION**

## **1.1 Background of the Study**

*Telferia occidentalis* (Fluted gound) is a member of the Curcurbitaceae family and grows in mainly the southern part of Nigeria. The plant is also found in some countries of West Africa although it is highly abundant in the Southern part of Nigeria. Bassey *et al.* (2022). *Telferia ocidentalis* (pumpkin) is a thread like green plants that usually has a big fruit with a hard cover. It has different traditional names, among Igbos, it is known a Ugwu, Iroko or Aporoko in Yoruba, Ubong in Efik, Umee in Urhobo and Umeke in Edo Akande *et al.* (2011). Sharma *et al.* (2023), reported that the leaves together with the edible shoots contain 85% moisture, 11% crude protein, 25% carbohydrates, 37% oil 11% ash and high content of iron as well as different essential macro and micro elements. The minerals namely calcium, potassium, magnesium, iron, sodium and phosphorus are concentrated in the Testa, pulp and husk. The crop is primarily grown as a leaf vegetable and used for human consumption and animal fodder; the high level of iron in *Telferia ocidentalis* (pumpkin) leaves extract seems to provide the basis for the folklore that it can be administered as a blood tank to convalescent persons.

The aqueous extracts of *Telferia Occidentalis* had been reported to reduce blood glucose level and also have antidiabetic effect in glucose induced *hyperglycaemic* and *streptozotocin* (STZ) induced diabetic mice while it did not alter the glucose levels in *normoglyceamic* mice (Gao *et al*., 2023). Recent scientific report notes that the aqueous extracts of *Telferia Occidentalis* leaf could assist in the purging of the gastrointestinal tract as revealed by the purgative effect of the aqueous extract of *Telferia Ocidentalis* leaf on isolated guinea pig ileum, and they concluded that there are some pharmacological effects underlying their mode of action (Gao *et al*., 2023).

Plants have been an integral part of human civilization, serving as a vital source of food, medicine, and various industrial products. Among the plethora of plants used for various purposes, the pumpkin (*Telferia* ocidentalis) has gained significant attention due to its multifaceted benefits. Pumpkins are not only cherished for their succulent fruit but also for their leaves, which possess potential therapeutic properties. These leaves have been traditionally used in folk medicine across different cultures to treat various ailments (Sharma *et al.*, 2023).

In recent years, there has been a particular interest in the antioxidant and health benefit of phytochemicals in foods and vegetables. This was as a result of potential efforts on human health. These antioxidants are a wide range of substances or molecules that naturalize harmful, compounds called free radicals that damage living cells. They are powerful substances that slow down the aging process, fight diseases and prevent some cancers. Antioxidants can take the form of enzymes in the body, vitamin supplements and nutritional additives. Although there are several enzyme systems within the body to scavenge free radicals, the principal micronutrients (vitamins), and antioxidants are vitamin E, Beta-carotene, flavonoids and vitamin C. The body cannot manufacture these micronutrients, so they must be supplied in the diets. Many vegetables contain health protective constituents, that are essential for preventing diseases and maintaining a state of wellbeing. Akande *et al.,* (2011).

Pumpkin is one such plant that is frequently being used as food as well as traditional medicine for long days (Muchirah *et al*., 2018). Cucurbita pepo is an herbaceous plant, belonging to a gourd family, Cucurbitaceae. The plant is good source of nutrients such as vitamin A and C. In many parts of the world, *Telferia ocidentalis* has been used to treat tapeworm infection, hypertrophy of the prostate, urinary problems, and burns Plants are known to contain innumerable biologically active compounds, which possess antibacterial, antidiabetic, anticancer, antioxidant activities. The seeds are used as a vermifuge, treat problem of the urinary system, hypertensions, prevents the formation of kidney stones, alleviate prostate diseases, and enhanced the erysipelas skin infection (Rosa, 2016). One hundred and nineteen secondary plant metabolites derived from plants are used as drugs globally. Therefore, it is imperative and of utmost significance to carry out a screening of these plants in order to validate their use in folk medicine and reveal the active principle by isolation and characterization of their constituents. However, bioactive compounds present in this plant are yet to be identified. Hence, the present study was designed to investigate for the presence of various phytochemicals in the leaf of *Telferia ocidentalis* which evokes various therapeutic effects (Arul and Saravanan, 2017).

Phytochemicals, also known as secondary metabolites, are bioactive compounds synthesized by plants that contribute to their medicinal properties. These phytochemicals exhibit a wide range of biological activities, such as antioxidant, anti-inflammatory, anticancer, and antimicrobial effects, making them promising candidates for drug development and functional food ingredients. Several studies have demonstrated the presence of phytochemicals in different parts of the pumpkin plant, including its leaves. According to Akande and Yahaya (2016), pumpkin (*Telferia ocidentalis*) is a widely cultivated and economically important plant belonging to the Cucurbitaceae family. It has a long history of human usage, dating back to ancient times when indigenous populations in the Americas first domesticated and cultivated it for its edible fruits and seeds. Over the centuries, pumpkin cultivation spread across different continents, and it became a staple food in various cuisines due to its nutritional value and versatility in culinary applications (Wu *et al.*, 2022).

In addition to its culinary significance, the pumpkin plant has been traditionally recognized for its medicinal properties. Various parts of the plant, including the leaves, seeds, and fruits, have been utilized in traditional medicine to address a wide range of health conditions. Traditional healers and herbalists have employed pumpkin leaves to treat ailments such as diabetes, hypertension, gastrointestinal disorders, and skin infections. The therapeutic potential of pumpkin leaves is attributed to the presence of diverse phytochemicals. Phytochemicals are secondary metabolites produced by plants, which often serve as defense mechanisms against pests, pathogens, and environmental stressors. Many phytochemicals have demonstrated bioactive properties that can positively influence human health when consumed in appropriate quantities (Udosen, 2022).

## **1.2 Statement of the Problem**

Despite the traditional use of pumpkin leaves (*Telferia ocidentalis*) in various cultures for their medicinal properties, there is a lack of comprehensive scientific data on the phytochemical content of these leaves. While anecdotal evidence and traditional knowledge suggest that pumpkin leaves possess therapeutic benefits, the specific bioactive compounds responsible for these effects remain unidentified and unquantified. This knowledge gap hinders the potential integration of pumpkin leaves into modern healthcare practices and limits their exploration as sources of novel drugs and nutraceuticals.

## **1.3 Aim and Objectives of the Study**

The aim of this study is to carry out Phytochemical Screening of Water Extract of Pumpkin Leaves, under the following specific objectives

1. To conduct a comprehensive phytochemical screening of the water extract of pumpkin leaves.
2. To reveal the medicinal importance of the plant
3. To add the data for local use in the area by traditional medicine practitioners.

## **1.4 Significance of the Study**

The significant of the study include providing valuable insights into the potential pharmacological effects of pumpkin leaves. Understanding the bioactive compounds present can facilitate the development of plant-based drugs and nutraceutical products.

## **1.5 Scope of the Study**

This study will focus on the phytochemical screening of the water extract of pumpkin leaves from the species *Telferia ocidentalis*.The water extract will be subjected to various qualitative analyses to identify the presence of major phytochemical classes, including but not limited to alkaloids, flavonoids, phenolics, terpenoids, and saponins.

# **CHAPTER TWO**

# **LITERATURE REVIEW**

## **2.1 Introduction**

This chapter presents a comprehensive literature review on the phytochemical composition of pumpkin leaves (*Telferia ocidentalis*) and related studies exploring their potential therapeutic applications. The review focuses on recent research and publications that shed light on the bioactive compounds present in pumpkin leaves, their health benefits, and their relevance to modern medicine and nutraceutical industries. The collected evidence serves as a foundation for the current study and provides insights into the potential uses of pumpkin leaves in healthcare.

## **2.2 Phytochemical Profile of Pumpkin Leaves**

Pumpkin leaves (*Telferia ocidentalis*) are known to contain a diverse array of phytochemicals, which contribute to their potential medicinal properties. Recent research has shed light on the specific bioactive compounds present in these leaves, revealing their significance as a source of valuable phytochemicals. Numerous studies have investigated the phytochemical composition of pumpkin leaves to elucidate the specific bioactive compounds responsible for their medicinal properties. Gao *et al.* (2022), conducted a comprehensive review on the phytochemical profile of pumpkin leaves and reported the presence of various classes of secondary metabolites, including alkaloids, flavonoids, phenolic compounds, terpenoids, and saponins. These bioactive compounds are known for their diverse biological activities, such as antioxidant, anti-inflammatory, antidiabetic, and antimicrobial effects.

A comprehensive review by Gao *et al.* (2022), summarized the phytochemical profile of pumpkin leaves, highlighting the presence of various classes of secondary metabolites. These include alkaloids, flavonoids, phenolic compounds, terpenoids, and saponins. Alkaloids are nitrogen-containing compounds known for their potential pharmacological effects, and they have been detected in pumpkin leaves, although specific alkaloids may vary depending on the pumpkin species.

Flavonoids are a major class of bioactive compounds in pumpkin leaves. They encompass a wide range of compounds such as quercetin, kaempferol, and rutin. Flavonoids are potent antioxidants with anti-inflammatory properties, making them important candidates for various health applications.

Phenolic compounds are another significant group of phytochemicals found in pumpkin leaves. These include phenolic acids, such as caffeic acid and ferulic acid, and other polyphenols. Phenolic compounds are well-known for their antioxidant and anti-inflammatory activities, and their presence in pumpkin leaves contributes to their potential health benefits.

Terpenoids, including carotenoids, and saponins are also detected in pumpkin leaves. Carotenoids are responsible for the vibrant orange color of pumpkins and possess antioxidant properties that are beneficial for human health. Saponins, on the other hand, exhibit diverse biological activities, including antimicrobial and anti-inflammatory effects.

Kaur *et al.* (2023) conducted a study focusing on Cucurbita maxima, which included an analysis of the phytochemical content in its leaves. The researchers identified specific flavonoids, such as quercetin and kaempferol, along with phenolic acids. These compounds were found to contribute significantly to the antioxidant capacity of the leaves, underscoring their potential health-promoting effects.

Understanding the phytochemical composition of pumpkin leaves is vital for exploring their potential therapeutic applications. These bioactive compounds contribute to the leaves' antioxidant, anti-inflammatory, and antimicrobial properties, making them valuable candidates for various health-related uses.

The presence of such diverse phytochemicals in pumpkin leaves not only makes them suitable for traditional medicinal applications but also positions them as promising sources for drug development and nutraceutical formulations. Further research into the individual bioactive compounds and their specific mechanisms of action may unlock the full potential of pumpkin leaves as a valuable resource in modern medicine and functional food industries.

## **2.3 Antioxidant Activity**

Antioxidants play a crucial role in protecting the body against oxidative stress, which occurs when there is an imbalance between reactive oxygen species (ROS) and the body's antioxidant defense mechanisms. Excessive ROS can damage cellular components, including lipids, proteins, and DNA, leading to various diseases and aging processes. Therefore, the antioxidant activity of plant-derived compounds, including those found in pumpkin leaves (*Telferia ocidentalis*), has garnered significant attention in recent years.

A study conducted by Almeida *et al.* (2022), investigated the antioxidant potential of Cucurbita pepo L. leaves, a close relative of the pumpkin species. The researchers evaluated the leaves' ability to scavenge free radicals and assessed their total antioxidant capacity using various in vitro assays. The results revealed significant antioxidant activity, attributed to the presence of various phytochemicals, including phenolic compounds and flavonoids.

Gao *et al.* (2022), reviewed the literature on pumpkin leaves and highlighted their antioxidant properties. The review reported that pumpkin leaves contain a wide range of antioxidants, such as carotenoids, flavonoids, and phenolic compounds, which contribute to their free radical-scavenging abilities. These antioxidants are essential in neutralizing ROS and preventing oxidative damage to cells, thereby conferring potential health benefits.

The antioxidant activity of pumpkin leaves has implications beyond their role in traditional medicine. As consumers increasingly seek natural alternatives to synthetic antioxidants, plant-derived antioxidants have gained attention in the food and cosmetic industries. Pumpkin leaf extracts have shown promise as natural antioxidants for use in food preservation and skincare products due to their effectiveness in inhibiting lipid oxidation and protecting against UV-induced skin damage (Sharma *et al.*, 2023).

The presence of potent antioxidants in pumpkin leaves not only supports their traditional medicinal uses but also makes them valuable candidates for functional foods and nutraceutical formulations. Incorporating pumpkin leaf extracts into diets or dietary supplements may help combat oxidative stress-related diseases and promote overall health and well-being.

## **2.4 Anti-Inflammatory Properties**

Inflammation is a complex biological response triggered by the immune system to protect the body from harmful stimuli, such as pathogens and tissue damage. While acute inflammation is a necessary defense mechanism, chronic inflammation can lead to various chronic diseases, including cardiovascular disorders, autoimmune conditions, and certain cancers. Therefore, identifying natural compounds with anti-inflammatory properties, such as those found in pumpkin leaves (*Telferia ocidentalis*)has become a subject of great interest in medical research.

A recent review by Khan *et al.* (2023), highlighted the anti-inflammatory potential of pumpkin leaves based on existing research. The review emphasized the role of specific bioactive compounds, particularly *cucurbitacins* and quercetin, in modulating inflammatory responses. *Cucurbitacins* are triterpenoids known for their anti-inflammatory effects by inhibiting pro-inflammatory enzymes, cytokines, and transcription factors. Quercetin, a flavonoid, exerts anti-inflammatory actions by blocking signalling pathways involved in inflammation.

Another study by Almeida *et al.* (2022), investigated the anti-inflammatory activity of *Telferia ocidentalis* leaves, which are closely related to pumpkin leaves. The researchers utilized in vitro assays to evaluate the leaves' ability to suppress the production of inflammatory mediators. The results demonstrated significant inhibition of inflammatory markers, indicating the potential of pumpkin leaves in mitigating inflammation.

Furthermore, the anti-inflammatory properties of pumpkin leaf extracts have implications beyond their traditional use. Research has suggested their potential as ingredients in topical formulations for skin conditions characterized by inflammation, such as eczema and psoriasis. Sharma *et al.* (2023), evaluated the antioxidant and anti-inflammatory activities of water extracts from Cucurbita maxima leaves. The study revealed not only potent antioxidant activity but also significant anti-inflammatory effects, supporting their application in skincare products.

The anti-inflammatory properties of pumpkin leaves can be attributed to the synergistic actions of multiple phytochemicals present in the leaves. These compounds work collectively to suppress inflammatory pathways and cytokine production, making pumpkin leaves promising candidates for managing inflammation-related disorders.

## **2.5 Antimicrobial Activity**

The emergence of drug-resistant microbes has prompted the search for alternative antimicrobial agents. Several studies have investigated the antimicrobial potential of pumpkin leaves. Sharma *et al*. (2023), evaluated the antimicrobial activity of water extracts from Cucurbita maxima leaves against various pathogens. The study demonstrated significant inhibitory effects against both Gram-positive and Gram-negative bacteria, as well as certain fungi. The antimicrobial activity was attributed to the presence of alkaloids and saponins in the extracts. Antimicrobial activity refers to the ability of a substance to inhibit the growth or kill microorganisms such as bacteria, fungi, and viruses. The search for natural antimicrobial agents has gained prominence due to the rise of antibiotic resistance and the need for alternative strategies to combat infectious diseases. Pumpkin leaves (*Cucurbita spp*.) have been investigated for their potential antimicrobial properties, and research in this area has yielded promising results.

A study conducted by Sharma *et al.* (2023), evaluated the antimicrobial activity of water extracts from Cucurbita maxima leaves. The researchers performed in vitro assays to test the extracts against a panel of bacteria and fungi. The study revealed significant inhibitory effects against both Gram-positive and Gram-negative bacteria, including Staphylococcus aureus and Escherichia coli, as well as certain fungi, such as Candida albicans. The findings suggest that pumpkin leaves possess broad-spectrum antimicrobial activity, making them potentially valuable in addressing infectious diseases caused by various pathogens. Furthermore, pumpkin leaves have been investigated for their potential as natural preservatives in food and beverages. The presence of antimicrobial compounds in the leaves can help inhibit the growth of spoilage microorganisms, extending the shelf life of perishable foods. This has implications for food safety and sustainability in the food industry (Sharma *et al.,* 2023).

The antimicrobial activity of pumpkin leaves can be attributed to the presence of various bioactive compounds, including alkaloids, flavonoids, and saponins. These compounds are known for their ability to disrupt microbial cell membranes, interfere with microbial enzyme systems, and inhibit microbial growth (Gao *et al.,* 2022).

Moreover, pumpkin leaf extracts have also shown potential as natural antiviral agents. In a preliminary investigation, pumpkin leaf extracts demonstrated inhibitory effects against certain viruses, suggesting their potential use in viral infection management (Gao *et al*., 2022). Pumpkin leaves exhibit significant antimicrobial activity against a wide range of bacteria and fungi. Their potential as natural antimicrobial agents hold promise for applications in both traditional medicine and modern industries, such as food preservation and antiseptic formulations. The research on antimicrobial properties of pumpkin leaves highlights their multifaceted benefits and their potential as a sustainable and eco-friendly alternative to conventional antimicrobial agents.

## **2.6 Other Potential Health Benefits**

In addition to antioxidant and anti-inflammatory properties, pumpkin leaves (*Telferia ocidentalis*) have been associated with several other potential health benefits. Research in this area has explored various aspects of their medicinal properties, revealing promising findings.

A comprehensive review by Gao *et al.* (2022), highlighted the potential antidiabetic effects of pumpkin leaves. The review discussed the presence of bioactive compounds in the leaves that may contribute to improved glucose metabolism and insulin sensitivity. Several studies have reported the hypoglycemic properties of pumpkin leaf extracts, making them of interest for managing diabetes and related metabolic disorders.

Moreover, pumpkin leaves have shown promise in addressing parasitic infections. Khan *et al.* (2023), presented a review on the medicinal potential of pumpkin leaves, emphasizing their possible antiparasitic effects. Extracts from pumpkin leaves have demonstrated inhibitory activity against certain parasites, suggesting their use as a natural alternative for managing parasitic infections.

Furthermore, pumpkin leaves have been evaluated for their potential cardiovascular benefits. The presence of phytochemicals, such as flavonoids and phenolic compounds, supports their use in promoting heart health. These bioactive compounds have been associated with reducing blood pressure, improving lipid profiles, and protecting against oxidative stress, all of which contribute to cardiovascular well-being (Gao *et al.*, 2022). The nutritional composition of pumpkin leaves also makes them valuable as a source of essential nutrients. Pumpkin leaves are rich in vitamins, including vitamin A, vitamin C, and vitamin K, as well as minerals like iron and calcium. These nutrients play crucial roles in various physiological processes, supporting overall health and immune function (Khan *et al.*, 2023).

Preliminary studies have also suggested potential anticancer properties associated with pumpkin leaves. Some bioactive compounds present in the leaves have been investigated for their cytotoxic effects on cancer cells. However, further research is needed to elucidate the mechanisms and explore their potential applications in cancer treatment (Gao *et al.*, 2022). The diverse array of beneficial properties exhibited by pumpkin leaves makes them an intriguing subject for further research and applications in traditional medicine, functional foods, and nutraceutical industries.

The literature review reveals that pumpkin leaves are a rich source of diverse phytochemicals with potential therapeutic properties. Their antioxidant, anti-inflammatory, and antimicrobial activities, along with other potential health benefits, highlight their relevance in modern medicine and nutraceutical applications. The findings from these studies provide a solid foundation for the current research, which aims to conduct a comprehensive phytochemical screening of the water extract of pumpkin leaves and further explore their potential as natural sources of therapeutic agents.

# **CHAPTER THREE**

# **MATERIALS AND METHODS**

## **3.1 Materials**

* Dried pumpkin leaves
* Distilled water
* Methanol
* Chloroform
* Sulfuric acid
* Ammonia solution
* Glacial acetic acid
* Hydrochloric acid
* Ferric chloride
* Potassium ferric cyanide
* Sodium Hydroxide
* Dragendorff”s reagent
* Mayer’s reagent

## **3.2 Methods**

### **3.2.1 Sample Collection and Preparation**

Pumpkin leaves were plucked from farms within the Federal Polytechnic, Mubi, Adamawa State, and taken to the Laboratory of the Department of Science Laboratory Technology, Federal Polytechnic, Mubi. The leaves were washed to remove dirt, and sliced. The leaves samples were Sun-dry for 7 days and afterwards were pulverized to obtain finer ground powder, using an electric grinder.

### **3.2.2 Extraction Procedure**

#### **3.2.2.1. Aqueous Extract**

This was carried out by method described by Davis (1956), through the use of pestle and mortar, dry powder of pumpkin leaves was homogenized at ratio of 1:8 w/v in sterile distilled water and filtered through muslin cloth. This was followed by strained of filtrate obtained through filter paper (Whatman No. 1). The extraction procedure was done at room temperature.

#### **3.2.2.2 Ethanolic Extract**

This was prepared by soaking 400g of the dry pumpkin leaves in 1000 ml of ethanol for 48hrs at room temperature. Thereafter, extract was filtered through a Whatman filter paper No. 42 (125 mm) and subsequently through cotton wool. The extract was then concentrated using a rotary evaporator with the water bath set at 40oC was used to concentrate extract to one-tenth its original volume and finally with a freeze drier. This was followed by storage of dried residue at 4ºC. The crude extract residue were then weighed and dissolved in distilled water for experimental analysis.

### **3.2.3 Phytochemical Screening**

Tests were carried out on the aqueous extract to identify the phyto constituents using standard procedures as described by Harborne (1973), Sofowara (1993) and Trease and Evans (1989).

#### **3.2.3.1. Test for Tannins**

This was done by boiling 1g of each of the dried powdered samples (separately) in 40 ml of water in a test tube and then filtered. A brownish green or a blue-black coloration was observed after addition of a few drops of 0.1% ferric chloride.

#### **3.2.3.2. Test for Phlobatannins**

An aqueous extract of the dry Pumpkin leaves was boiled with 1% aqueous hydrochloric acid. Appearance of red precipitate indicates the presence of phlobatannins.

#### **3.2.3.3 Test for Saponins**

To 10 ml of distilled water, 1 g of the powdered dry Pumpkin leaves (separately) was added and boiled in a water bath. The mixture was then filtered and to resultant 5ml of filtrate, 2-3 ml of distilled water was added and shook vigorously for attainment of a stable persistent froth. Then, followed by mixture of frothing with 1-2 drops of olive oil and shook vigorously, then observed in the formation of emulsions.

#### **3.2.3.4 Test for Flavonoids**

This was determined through heating of 0.5g of the dry powdered of pumpkin leaves extract sample (separately) with ethyl acetate (10 ml) over a steam water bath for 3 min. To 1 ml of dilute ammonia solution, 4ml of filtrate from the filtered mixture was added and shook. Appearance of yellow coloration is an indication of presence of flavonoids.

#### **3.2.3.5. Test for Steroids**

This was carried out by addition of 4 ml of acetic anhydride to 1 g of each of the crude extract (separately) with further addition of H2SO4 (2 ml). The presence of steroids was indicated by change of colour from violet to blue or green.

#### **3.2.3.6 Test for Terpenoids**

This was carried out by Salkowski’s test described by Parekh and Chands (2008), To 4ml of chloroform, 10ml of the crude extract was added, followed by the careful further addition of 5ml concentrated (H2SO4). Formation of the reddish-brown coloration at the interface is an indication of a positive result for the presence of terpenoids.

#### **3.2.3.7 Test for Cardiac Glycosides**

The Keller-Killani test method described by Parekh and Chands (2008) was used for Cardiac Glycosides determination. To 2 ml of glacial acetic acid containing one drop of ferric chloride (FeCl3) solution, 5 ml of the plant extract was added, this was followed by addition of 1 ml concentrated Sulfuric acid. Brown ring was formed at the interface which indicated the presence of deoxy sugar of cardenolides. A violet ring may appear below the brown ring, though in the acetic acid layer, a greenish ring may also form just progressively throughout the layer.

#### **3.2.3.8 Test for Anthraquinones**

About 5 ml of each of the plant extracts was boiled with 10 ml of sulfuric acid (H2SO4) and was filtered while hot. The filtrate was shaken with 5 ml of chloroform. The chloroform layer was pipette into another test tube and 1 ml of dilute ammonia was added. The resulting solution was observed for color changes (Sofowara, 1993).

#### **3.2.3.9 Test for Alkaloids**

About 5 ml of the Pumpkin leaves’ extracts were added to 8 ml of 1% HCl mixed, warmed and later filtered. Meyer’s and Dragendorff’s reagents were added to the 2 ml of the filtrate, then alkaloids absence or presence were determined based on the turbidity or precipitate development (Parekh and Chands, 2008).

#### **3.2.3.10 Test for Phenols**

A small amount of methanolic extract was taken with 1ml of water in a test tube and 1 -2 drops of Iron III Chloride (FeCl3) was added. Blue and green colours were observed.

# **CHAPTER FOUR**

# **RESULTS AND DISCUSSION**

## **4.1 Results**

**Table 1: Shows the Phytochemical Analysis of *Telferia occidentalis* (Fluted gound) Leaves**

|  |  |  |
| --- | --- | --- |
| **Test** | **Aqueous** | **Methanolic** |
| Alkaloids | + | + |
| Cardiac Glycosides | + | - |
| Flavonoids | + | + |
| Free Anthraquinones | - | - |
| Phlobatannins | + | + |
| Polyphenols | + | + |
| Saponnins | + | - |
| Steroids | - | + |
| Tannins | + | - |
| Terpenoids | + | - |

## **4.2 Discussion**

Phytochemicals are biologically chemical active compounds in plants which wield both medicinal and nutritional potentials. This is evident by the fact that the n-hexadecanoic acid, one of the major compounds in the methanol leaf extract of *T. occidentalis* has been described as a potential antioxidant and as well as a dependable anticancer agent. Table 1 above shows the result obtained from the phytochemical analysis performed on *Telfaria occidentalis* (fluted gound). The analysis revealed the presence of phlobatannins, polyphenols, alkaloids, steroids and flavonoids in the methanolic leaf extract of fluted pumpkin. The absence of terpenoids, anthraquinones, cardiac glycosides, tannins and saponins in the methanolic leaf extract was also revealed. This may be attributed to the solubility characteristics of the phytochemicals in the solvent (methanol) used for extraction (Bassey *et al.,* 2022).

The analysis also revealed the presence of Terpenoids, cardiac glycosides, phlobatannins, polyphenols, tannins, saponins, alkaloids and flavonoids in the aqueous leaf extract of fluted pumpkin. The absence of both anthraquinones and steroids in the aqueous leaf extract was observed.

The results furthermore revealed that alkaloids, flavonoids, phlobatannins and polyphenols were present in both aqueous and methanolic extract, this coincide with the result obtained by Akande *et al.,* (2011) which revealed that vegetables are rich sources of phytochemicals which have a protective and therapeutic effects essential to prevent diseases and maintaining a state of wellbeing by stimulating enzymes in the liver that render some carcinogens harmless.

# **CHAPTER FIVE**

# **CONCLUSION AND RECOMMENDATION**

## **5.1 Conclusion**

Findings from this research clearly justify the known fact that *T. occidentalis* (fluted gound) are rich in phytochemicals such as tannins and saponins known for their characteristic therapeutic and prophylactic potentials. Also, the presence of Alkaloids, Flavonoids, Phlobatannins and Polyphenols in both extracts which are known for their medicinal benefits such as anticancer, antioxidant, protection against cardiovascular diseases, analgesic and antidiabetic etc. The intake of this plant chemicals has a protective potential against some tropical diseases such as aneamia, diabetes and cancer.

## **5.2 Recommendation**

It was recommended that the*Telfaria occidentalis* (fluted pumpkin) leaves should be taken because of the numerous nutritional and medicinal attributes ascribed to it and it should be taken especially by those suffering from aneamia, diabetes and cancer.

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