Journal of Biology and Genetic Research Vol. 11 No. 4 2025 E-ISSN 2545-5710
P-ISSN 2695-222X www.iiardjournals.org

Investigating the Medicinal and Nutritional Values of *Vitex Doniana* Using Phytochemical Analysis Within the South-South Zone, Nigeria

Ogbeche Cecilia Agbo-Onyeche
Department of Biology, Federal College of Education,
Okene Kogi State, Nigeria
Cecyogbeche@gmail.com (07033480555)
DOI:10.56201/jbgr.vol.11.no4.2025.pg44.55

Abstract
This study investigates the medicinal and nutritional values of vitex doniana. Fruits and vegetables have long been recognized as vital sources of dietary and micronutrients. Their intake is encouraged for the prevention and management of diseases, as well as for promoting overall health, due to their rich content of vitamins, fiber, minerals, and bioactive compounds. Providing in-depth information on the nutritional and medicinal properties of Vitex doniana *the beneficial components found in its leaves, fruits, stems, roots, and bark* becomes eminent. *The study examined the phytochemical content and antimicrobial properties of methanolic and acetone extracts from the fruit, leaves, stems, bark and roots of* Vitex doniana. *The research has deepened ones understanding of* Vitex doniana *significance in health benefits and nutritional values. The study concludes with recommendations based on the findings and suggests areas for further research.*

Keywords: *Medicinal values, Nutritional Values, Vitex doniana, and Phytochemical analysis.*

Introduction

Vitex doniana also known as black plum and chocolate berries is a medium-sized deciduous tree with a heavy, rounded crown, growing up to 20 meters tall. According to Orwa *et al*. (2009), the tree grows in various habitats, including dense forests, wooded savannas, and coastal savannas, it has a moderate growth rate. The tree is widely distributed in tropical Africa and is valued for its medicines and nutritional materials. Different parts of the plant, including the fruits, roots, leaves, and bark, are utilized to treat a variety of ailments and it is a highly nutritious plant species that remains underexploited due to limited public awareness of its benefits (Adjei et al., 2021). Although it is readily available, many individuals find it less appealing compared to more familiar fruits and vegetables, possibly due to its perceived limited culinary versatility. Nonetheless, it holds significant potential as a functional food and medicinal resource (Irampagarikiye et al., 2025). It is grown in tropical Africa including Northern, Eastern, Western and Southern Nigeria (Dalziel and Hutchison, 1955 in Aiworigbe *et al*., 2018). In Nigeria it is known by various local name by different tribes Diliyar in Hausa, Orinla in Yoruba, Uchakoro in Igbo Oriri in Esan, Galbibi in Fulani, Udu in Idoma and Yala, Ejiji in Igala, Ozunchi in Ebira, Hulugh in Tiv.

Historically, plants have served as vital sources of food and medicine for humans. Numerous studies have confirmed the effectiveness of medicinal plants in disease prevention and health management. In many regions of Africa, traditional herbal remedies are frequently preferred over

synthetic drugs, partly due to their affordability, availability, and fewer side effects. Recent findings have shown that many medicinal plants, including *Vitex doniana*, exhibit promising biological properties such as anti-inflammatory, analgesic, and antioxidant activities, making them suitable candidates for treating ailments like diabetes, infertility, leprosy, insomnia, rheumatism, and gastrointestinal disorders (Owolabi et al., 2022). It is believed that the use of plants especially vegetables for the management, treatment and maintenance of good health has been well researched. Edeoga and Ereiat, (2001); Aworiegbe et al (2018); Kambba and Hassan (2010) reported that plants and plants based products are the bases of many modern pharmaceuticals used today for treatment of various ailments.

Vitex doniana has been distributed through natural way to almost every part of Nigeria and endowed with huge pharmaceutical content. Despite its extensive use in indigenous health systems, particularly in parts of Africa, *Vitex doniana* is often undervalued in modern Nigerian contexts, where it is primarily regarded as a famine food or poor man's vegetable. This perception undermines its pharmacological and nutritional importance, despite the plant's richness in bioactive compounds with therapeutic potential (Adedapo et al., 2020).

According to WHO (2010) about 80% of the world populations depend on plants based medicine for their health care. Leaves of plants are known to contribute about 90% of vitamins (45% of vitamin A and 27% of vitamin B. 17% of thiamin, 15% of Niacin, 16% of Mg, 19% of Fe and 9% of the perception availability of protein in conjugation with fruit and nuts in the African diets, their protein are of high quality relative to their content of essential amino acids, other important nutrients supplied by vegetable include folic acid, ribofiarin, Zn Ca, K and P (Gockowosk *et al*., 2003). WHO (1996) reported that the majority of population in developing country like Nigeria still rely on herbal medicine to meet their health needs, in respect to this, modern society is now embracing the use of plants and plant-based products to meet societal health needs due to the fact that indiscriminate use of commercial antibiotics commonly utilized in the treatment of infectious disease has led to the development of multiple drug resistance with attendant adverse effect on the host (Guptat *et al*., 2008). This emergence of pathogens resistance to antibiotics as a result of their excessive use represents a serious public health concern (Keymanesh *et al*., 2009). The resistance of bacteria and fungi is becoming increasingly important (Layinka *et al*., 2017). This resistance has led to the search for plants with antimicrobial activity in recent years. There are other factors that are responsible for the use of plants in traditional as well as in modern medicine (Synthetic), they include safety cost effectiveness (Koche *et al*., 2011) and administration of synthetic drugs (Sharif, 2001). Antimicrobials from plant origin have been found to have great therapeutic potentials, such plants have effectively used in the treatment of infectious diseases to mitigate. Many of the side effect that are associated with synthetic antimicrobial (Perumisary and Ignacimuthu 2000)

In tropical traditional medicine in tropical Africa *Vitex doniana* can be used to control libido in man and helps in the treatment of infertility/sterility, aneamia, Jaundice, Leprosy, diarrhea and dysentery, for food purposes, regulate the menstrual cycle, analgesic, anti-inflammatory, and cytotoxic activities against cell lines and antidote against snake bites and arrow poison, for the treatment of certain cancer, wounds, epilepsy, nausea, mental illness, rheumatism, gastrointestinal disorder and urinary conditions (Ivvire 1961; Oumorou *et al.*, 2010; Amegbor, 2012; Ajiboye, 2015; Akwugbe, 2015; Oboh, 2015; Aiworiegbe *et al*., 2018; Poussian et al., 2022). The fruit can produce syrup similar to honey (Janic and Paul, 2008; Aiworiegbe, 2018). Studies also shows that phytochemical analysis of different parts of the plant extract revealed the presence of certain

secondary metabolic such as saponin, tanning, phenols carchae glycosides, flavonvids sterols and triterperes as well as a high concentration of sodium, potassium, calcium, iron, phosphorus and suphur (Irampagarikiye *et al*., 2025). These are evidence that *Vitex doniana* are of great medicinal and nutritional values. Therefore the study is aimed to gather more genuine information about the medicinal and nutritional value of *Vitex doniana* and to determine the antimicrobial activity of the phytochemicals analysis in *Vitex doniana* (fruit, leafs, back, stem and roots) and considering the proximate and light metal composition. Finally, to proffer solutions to making the plant an all year/season plant since it is a seasonal plant. The present study aims to investigate the phytochemical profile of *Vitex doniana* to promote its wider use in the prevention and treatment of diseases, while also exploring strategies for making it more widely available throughout the year, given its seasonal nature.

Statement of problem

Recently, there has been growing interest in anti-viral, anti-microbial, anti-fungal, anti diabetics agent as well as nutritional products from natural products especially those derived from organically grown plant like *Vitex doniana* with healing properties commonly used in traditional setting for the management of a number of diseases such as infertility problems inflammatory disorders stomach pains, diarrhea, rheumatic pains and dysentery, gastrointestinal disorders mental illness, urinary condition and certain cancer yet the plant is left unutilized because of lack of knowledge about it usefulness in south-south geopolitical zone of Nigeria as emphasis on the nutritional and medicinal values has not been fully captured, even in area were the plants are found in abundance people view it as ornamental plant instead of utilizing it for food or medicinal product which it serves. The fact that the rate of poverty has become so high and with so many people in the lowest class, the increase rise in the price of synthetic drugs has become high combined with the rate of adulterated drugs, plant used in traditional medicine to treat certain disease conditions are believed to have biologically active compounds, as the synthetic molecules used are very expensive for other poor patients. For the past decades, the federal governments have agitated to reform the traditional medicine sector in other to motivate the herbalist and uses of natural plant, the ministry of health is aware of this yet nothing has been done to improve and to encourage the traditional sector in Nigeria. The paper aimed at investigating the medicinal and nutritional values of *Vitex doniana* using phytochemical analysis within south-south geopolitical zone, Nigeria which is politically referred to as Niger Delta they includes Akwa Ibom Bayelsa, Cross River, Delta, Edo and Rivers respectively.

Aim and Objectives of the study

This study sought to investigate the nutritional and medicinal values of *Vitex doniana* using physiochemical analysis within the south-south geopolitical zone, Nigeria. To attain this, the following objectives were stated

- To identify and quantify the phytochemical constituent present in *Vitex doniana* leaves, stems and roots in the South – South zone Nigeria.
- To evaluate the medicinal values of *Vitex doniana* in the treatment of various ailments in the South – South zone Nigeria.
- To determine the nutritional values of *Vitex doniana* leaves, stems, and roots in terms of proximate composition, mineral content, and vitamin content

- To correlate the phytochemical constituents of *Vitex doniana* with medicinal and nutritional values.

Research Questions

- What are the Phytochemical constituents present in *Vitex doniana* leaves, stems, and roots in the south – south zone Nigeria?
- How medicinally valuable is *Vitex doniana* in the treatment of various ailments in the south – south zone, Nigeria?
- How nutritionally valuable are *Vitex doniana* leaves, stems and roots in terms of proximate composition, mineral content and vitamin content?
- How do phytochemical constituents of *Vitex doniana* correlate with its medicinal and nutritional values?

Instrument for Data Collection

Interviews were conducted by researchers in Akwa Ibom, Bayelsa, Cross River, Edo, and Rivers states to assess the level of awareness and knowledge about the use of *Vitex doniana* for medicinal and nutritional purposes among the local population in these states and determine the receptiveness of the people to both orthodox and traditional means of treating certain diseases and preventing malnutrition.

Fresh parts of *Vitex doniana* were obtained in January from the farm in Okuku Community in Yala Local Government Area of Cross River State, of the Niger Delta region for physiochemical analysis to check the biochemical properties responsible for healing and healthy living.

Method of data collection

A random sampling method was used to select 500 participants for the interviews. A structured questionnaire was used to guide the interviews and ensure consistency in data collection. Interviews were conducted in a neutral and non-threatening environment to encourage participants to share their honest opinions and experiences.

The study used a combination of qualitative and quantitative methods to analyze the phytochemical constituents. The leaf was destalked, and washed thoroughly with running water to remove contaminants. Some were half cooked, kept overnight to get the water, some were dried at room temperature for about two weeks. The dried leaves were pulverized to find granules using manual grinder. The methanoic acetone extracts of *Vitex doniana* fruit and leaf were thoroughly investigated to ascertain their biological potential.

The fresh fruits were rinsed highly with distilled water to remove sand and other unwanted materials and particles. It was manually milled using a sieve. The fruit pulp that would pass through the sieve (filtrate) would be collected in a container where the seed (residue) and the seed coat (pericarp) remained on top of the sieve. The pulp was spread on a flat pan that was covered with aluminum foil and was allowed under dying in a thermo-stated oven for 2 weeks , content reduced to a minimum. The dried fruit pulp was then beer grounded into powder and stored in a tight container for analysis of phytochemical screening and proximate analysis of nutritional value.

Result

The data collected from the interviews and laboratory work was analyzed and the results are presented in tables and figures to facilitate understanding and interpretation. The data are presented below:

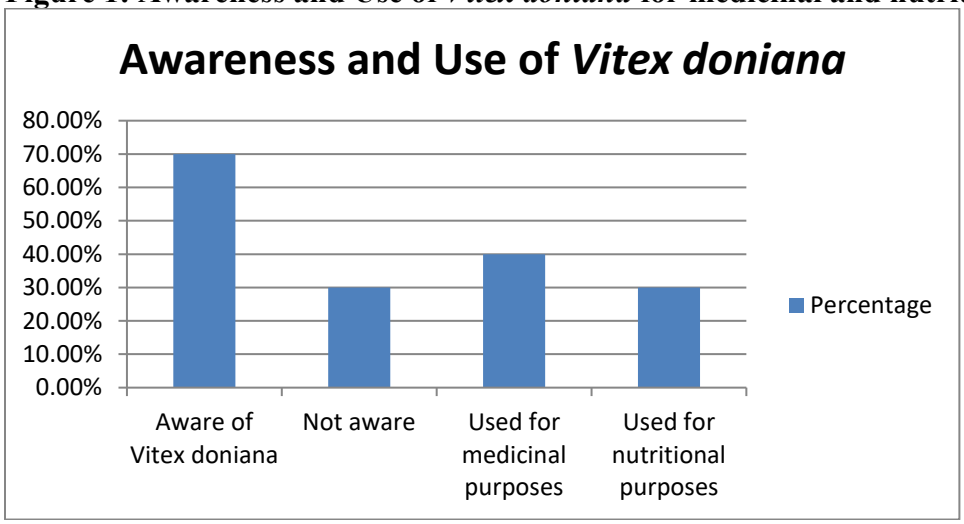
Awareness and Use of *Vitex doniana*

Table 1: preference for use of Vitex doniana in traditional medicine

Items	Percentage
Preferred *Vitex doniana* as traditional medicine	**60%**
Do not prefer *Vitex doniana* as traditional medicine	**40%**

60% of the participants preferred the use of *Vitex doniana* as traditional medicine, while 40% preferred orthodox medicine.

Figure 1: Awareness and Use of *Vitex doniana* for medicinal and nutritional purposes



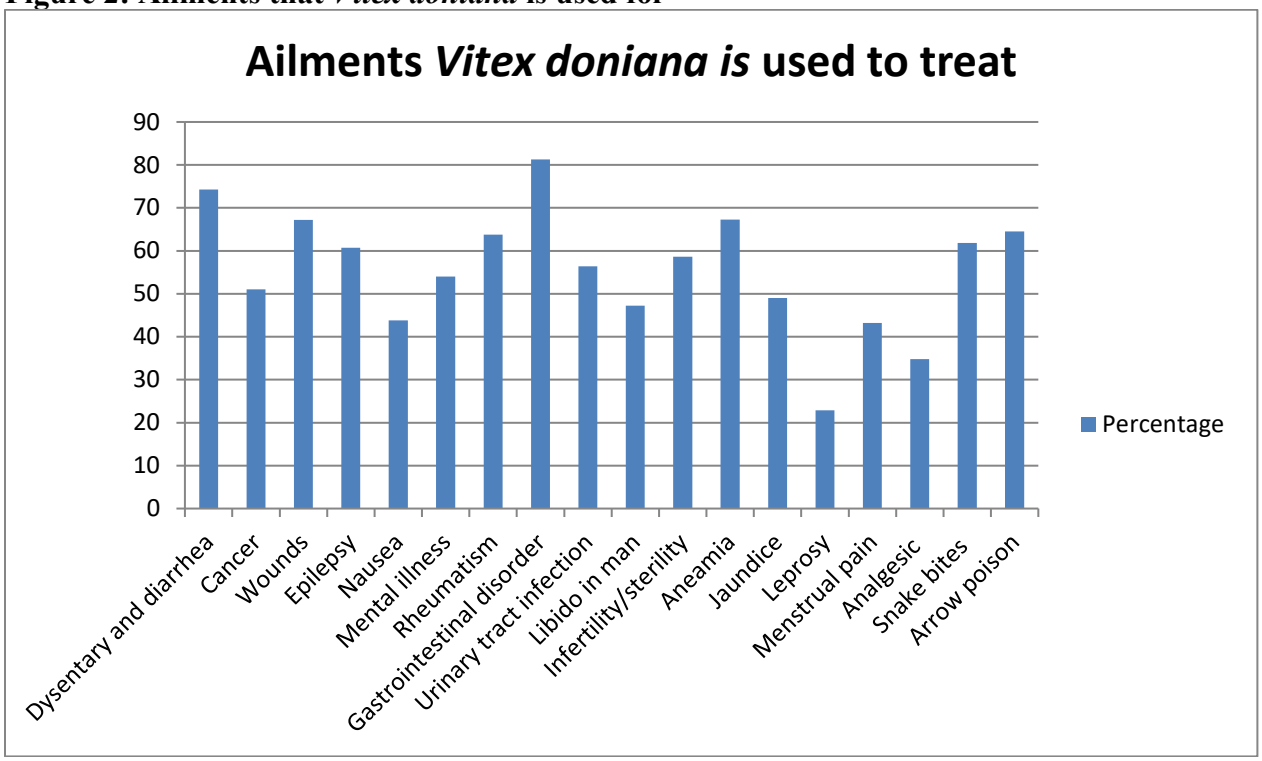
The interviews revealed that 70% of the participants were aware of *Vitex doniana* and its uses, 40% of the participants used *Vitex doniana* for medicinal purposes, while 30% used it for nutritional purposes. The main reasons for using *Vitex doniana* were its perceived efficacy, affordability, and accessibility.

Table 2: Plant parts use for medicinal purposes

Items	Response	Percentage
part of the plant used (Leaves, Bark, roots, fruits	Leaves Bark Roots Fruits	75% 82% 78.7% 24.6%

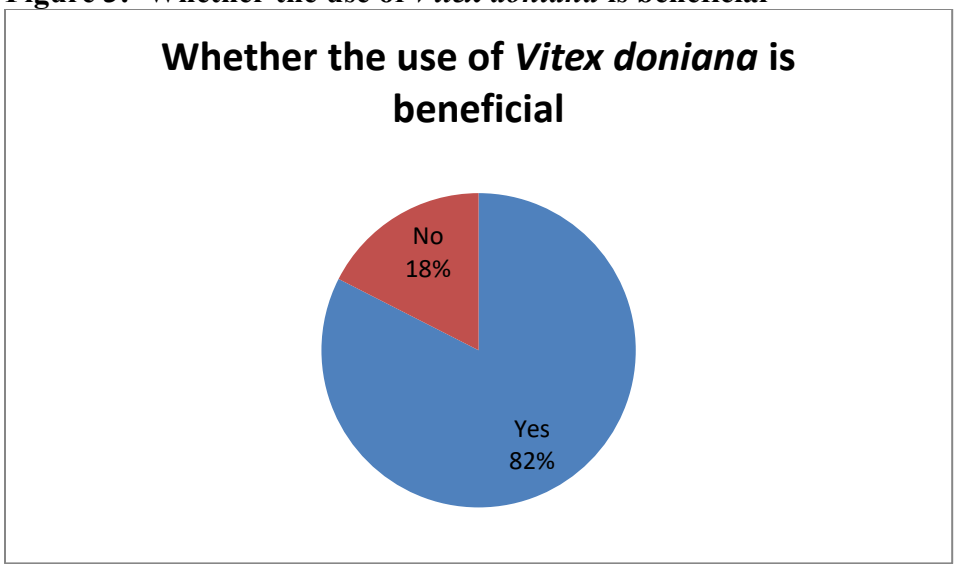
From the response of the respondents it was discovered that the bark is the most used (82%) while fruits is the least used (24.6%) for medicinal purposes in the study area

Figure 2: Ailments that *Vitex doniana* is used for



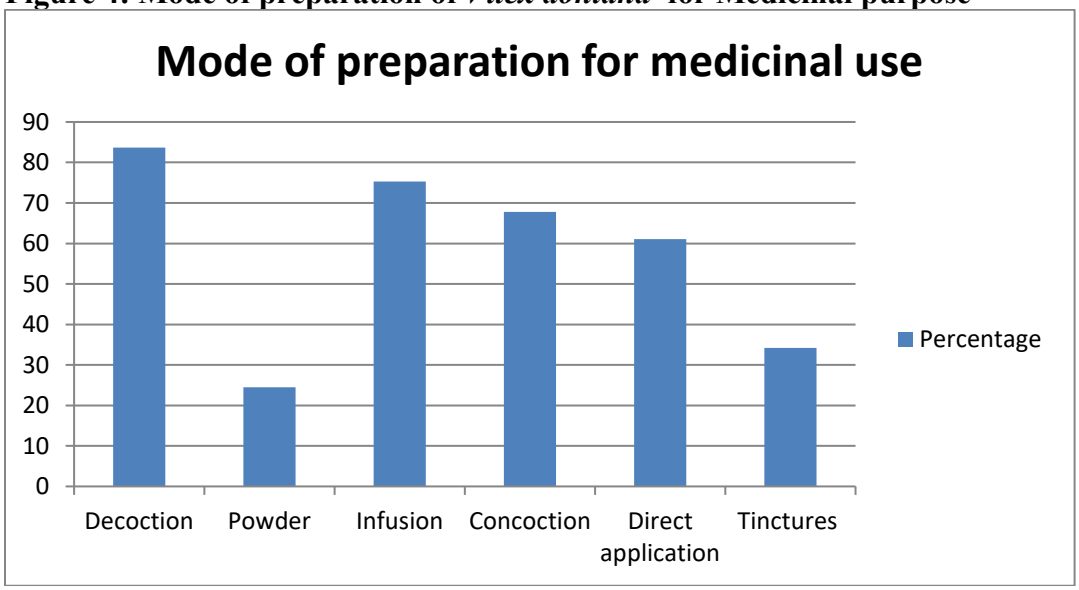
The Figure 2 above revealed that *Vitex doniana* is used for the treatment and management of various diseases in the study area as participants mentioned the above mentioned diseases although the percentage of usage differs in all majority use it to treat and manage gastrointestinal related problems, very few respondent indicated its use for leprosy treatment. It is deduced that it most effective for the treatment of gastrointestinal problems as majority use it for that purpose.

Figure 3: Whether the use of *Vitex doniana* is beneficial



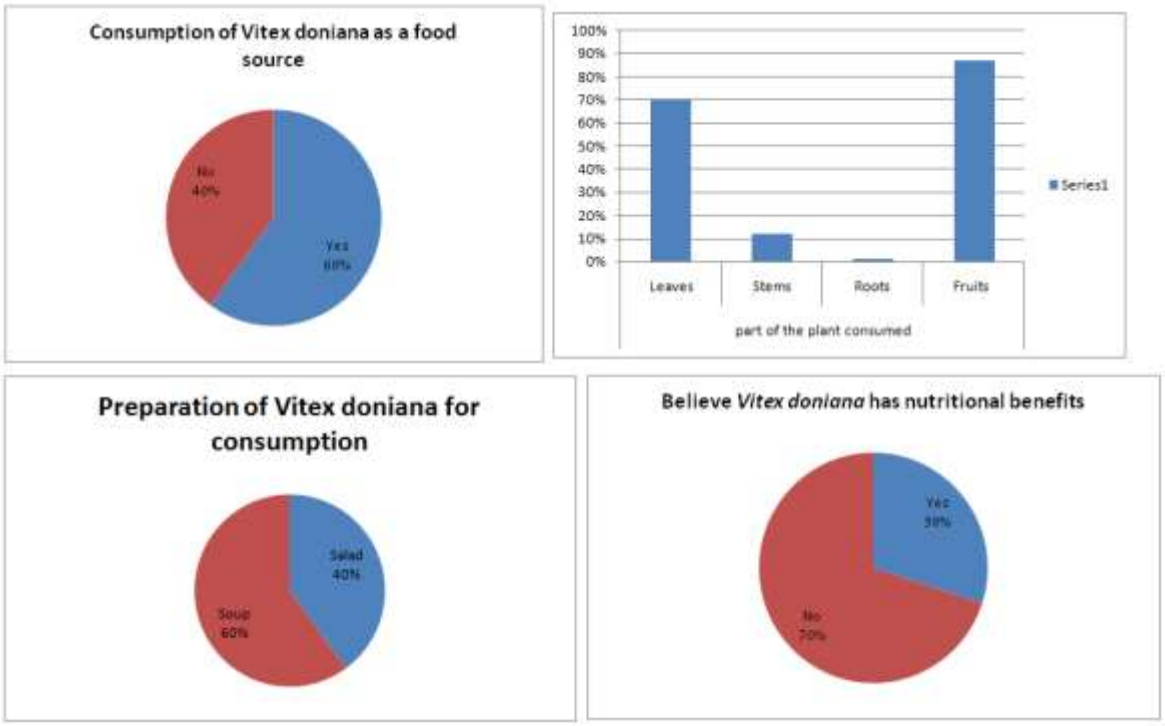
82% of the respondents agreed that the use of *Vitex doniana* is beneficial to them in traditional medicine, while only 18% did not see the benefit of *Vitex doniana* in traditional medicine.

Figure 4: Mode of preparation of *Vitex doniana* for Medicinal purpose



The Figure 4 above revealed that Mode of preparation of *Vitex doniana* for Medicinal purpose is mostly decoction, followed by infusion, then concoction, while the use as powder is the least

Figure 5: Use of *Vitex doniana* source of food



62% of the respondents agreed that the use of *Vitex doniana* is used as source of food, while 40% did not see *Vitex doniana* as food in any form. Fruits are most used as food while the root is not used as food and the preparation mode is basically soup and salad, but majority of the people do not believe that *Vitex doniana* has any nutritional value.

Table 2: Phytochemical Constituents

The laboratory results for the phytochemical constituents of *Vitex doniana* are presented below:

Plant parts	Alkaloids	Flavonoids	Saponins	Phenols	Tannins	Steroids	Glycosides	Terpenoids	Anthraquinones
Fruits	Present	Present	Present	Present	Present	Present	Present	Present	Absent
Leaves	Present	Present	Present	Absent	Present	Present	Present	Absent	Present
Bark	Present	Present	Present	Absent	Present	Present	Present	Absent	Present
Roots	Present	Present	Present	Absent	Present	Present	Present	Absent	Absent

The results show that *Vitex doniana* contains various phytochemical constituents alkaloids, phenols, flavonoids, Tannins, Steroids, Glycosides, Saponins Terpenoids and Anthraquinones which may contribute to its medicinal and nutritional values. These compounds have been reported to have various biological activities, including antioxidant which can help protect against oxidative stress and related diseases, anti-inflammatory, and antimicrobial effects.

Table 3: Proximate composition per 100g

The laboratory results for the Nutritional value of *Vitex doniana* are presented below:

	Water	Energy	Protein	Fat	Carbohydrate	Fiber	Ash	Calcium	Iron	Magnesium	Phosphorus	Ascorbic acid	Thiamine
Fruits	74.6%	435kj	0.7%	27.4%	62.3%	1.3%	0.9%	34mg	2.7mg	27.4mg	47mg	9mg	0.02mg
Leaves	77.03%	345kj	11.10%	2.92%	45.57%	17.5%	5.63%	85mg	4.05mg	52.5mg	48.07mg	20.8mg	0.01mg
Bark	71%	215kj	2.5%	1.5%	43.7%	19.5%	6.9%	62.5mg	3.25mg	51.8mg	44.9mg	21.03mg	0.001mg
Roots	78.05%	340kj	7.1%	2.0%	41.05%	19.4%	5.42%	76.09mg	mg	52.07mg	46.04mg	19.07mg	0.01mg

Vitex doniana parts are rich in Energy, fiber and protein, making them a good source of essential nutrients. The leaves are rich in vitamins and minerals which are essential for various bodily functions.

Discussion of Results

The analysis reveals that a significant majority of the respondents are aware of *Vitex doniana*, indicating a high level of awareness about the plant. This suggests that *Vitex doniana* is a well-known plant in the study area, and its medicinal properties are recognized by a significant proportion of the population. However, the percentage of respondents who use *Vitex doniana* for medicinal purposes and nutritional purposes is relatively lower. This suggests that while many people know about the plant, not all of them utilize it for its potential benefits.

The results also show that 60% of the respondents prefer the use of *Vitex doniana* as traditional medicine, while 40% prefer orthodox medicine. This indicates a strong inclination towards

traditional medicine, which may be due to various factors such as cultural beliefs, perceived efficacy, or accessibility and that traditional medicine is still widely used and accepted in the study area. The use of *Vitex doniana* for medicinal purposes by 40% of the respondents suggests that the plant may have perceived health benefits, the study also showed the use of *Vitex doniana* in controling libido in man and helps in the treatment of infertility/sterility, aneamia, Jaundice, Leprosy, diarrhea and dysentery, for food purposes, regulate the menstrual cycle, analgesic, anti inflammatory, and cytotoxic activities against cell lines and antidote against snake bites and arrow poison, for the treatment of certain cancer, wounds, epilepsy, nausea, mental illness, rheumatism, gastrointestinal disorder and urinary conditions (Aiworiegbe *et al*., 2018; Poussian et al., 2022). However, further studies are needed to confirm the efficacy and safety of the plant for specific medicinal uses.

The study also shows that *Vitex doniana* contains various phytochemical constituents including tannins, alkaloids, phenolic acids, and carotenoids, which may contribute to its medicinal and nutritional values. The results of the analysis provide valuable insights into the potential benefits in the treatment of various ailments as the study revealed the biochemical compounds present in *Vitex doniana*. These compounds have been reported to have various biological activities, including antioxidant, anti-inflammatory, and antimicrobial effects. The presence of various nutrients such as energy, fat, protein, fiber, minerals and vitamins in *Vitex doniana* suggests that the plant may have nutritional benefits that make it a valuable resource for food and health benefits (Irampagarikiye *et al*., 2025). The high level of awareness about the plant, combined with its potential medicinal and nutritional benefits, suggests that it could be a valuable resource for healthcare and nutrition. Although, further research is needed to fully explored on the potential benefits and risks associated with the use of *Vitex doniana*.

Conclusion

This work explored the nutritional and medicinal potential of *Vitex doniana*, a valuable tree species. The study began by examining the proximate composition of the parts of the plant, revealing its high carbohydrate and protein content. The phytochemical constituents, including alkaloids, flavonoids, saponins, phenols, tannins, steroids, and cardiac glycosides, were also identified. In conclusion, *Vitex doniana* has significant nutritional and medicinal potential, making it a valuable resource for various applications. Its awareness and use in traditional medicine are widespread. The plant's proximate composition, phytochemical constituents, and antimicrobial activity demonstrate its potential benefits as potential supplement for addressing malnutrition and related health issues.

Recommendations

The use of *Vitex doniana* for medicinal purposes by 40% of the respondents suggests that the plant may have perceived health benefits. However, further studies are needed to confirm the efficacy and safety of the plant for specific medicinal uses, identify the bioactive compounds responsible for the medicinal effects, as well as conduct pharmacological studies and clinical trials to support the use of the plant as a medicine. *Vitex doniana* could be incorporated into nutritional intervention programs to address malnutrition in developing countries.

Efforts could be made to conserve and sustainably harvest *Vitex doniana* trees to ensure the long-term availability of the fruit and its potential benefits.

Acknowledgment
The author received financial support for the research and publication of this article from an institutional based research intervention tertiary education trust fund (TETFund) through the directorate of research and publications, Federal College of Education Okene, Kogi state Nigeria.

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