



Preliminary Phytochemical and Antimicrobial Screening Of *Vitex Doniana* Leaves

¹ILOH EMMANUEL ONYEMA, ²ONYEMA ILOH BRIDGET,
³AGBAFOR K.N. AND R. UCHENNA EZEILO⁴

¹Department of Pure and Industrial Chemistry Chukwuemeka Odumegwu Ojukwu University,
P.M.B. 02 Uli Anambra State, Nigeria.

²Department of Chemical Pathology, Nnamdi Azikiwe University Teaching Hospital, Nnewi.
³Department of Biochemistry, Ebonyi State University, Abakaliki.

⁴Department of Chemistry/Biochemistry/Molecular Biology, Federal University Ndufu-
Alike Ikwo, Ebonyi State.

ABSTRACT:- Preliminary investigations were carried out on the leaves of *Vitex doniana* with the aim of validating its acclaimed potency as an antimicrobial agent and its traditional use in the treatment of diarrhea and other diseases. Phytochemical screening of *Vitex doniana* extract revealed the presence of alkaloids, flavonoids, saponins, glycoside and tannins. The antimicrobial screening showed that the plant extract have very strong inhibitory effects against the following test organisms: *Escherichia coli*, *Staphylococcus aureus*. These suggest the potential therapeutic potentials of the plant.

Keywords:- *Vitex doniana*, Phytochemicals and antimicrobial agents.

I. INTRODUCTION

The use of plants in the management and treatment of diseases started with life. In more recent years, with considerable research, it has been found that many plants do indeed have medicinal values [1, 2, 3, 4 and 5]. Medicinal plant can therefore be described as any plant which provides health-promoting characteristics, temporary relief from symptomatic problems or has curative properties. The therapeutic properties of medicinal plants are conditioned by the presence in their organs of active substances, such as alkaloids, flavonoids, glycosides, vitamins, tannins and coumarin compounds, which physiologically affect the bodies of humans and animals or which are biologically active in relation to the causative agents of various diseases. Ethnobotany (the study of traditional human uses of plants) is recognized as an effective way to discover future medicines [6, 7 and 8]. In 2001, researchers identified 122 compounds used in modern medicine which were derived from "ethnomedicinal" plant sources; 80% of these have had an ethnomedical use identical or related to the current use of the active elements of the plant. Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies, including aspirin, digitalis, quinine and opium. The use of herbs to treat disease is almost universal among non-industrialized societies, and is often more affordable than purchasing expensive modern pharmaceuticals [9].

The plant *Vitex doniana* belongs to the family of *verbenaceae* and order *lamiales*. It is called Black plum in English, Dinya in Hausa, Orinla in Yoruba and Uchakiri in Igbo. It grows in tropical and sub-tropical regions of the world [10 and 11].

II. MATERIALS AND METHODS

Plant Material

The leaves of the plant were collected, properly washed in tap water and then rinsed with distilled water. The rinsed leaves were dried at room temperature for one week. The dried leaves were pulverized using a sterile electric blender and stored in an airtight glass container away from sunlight until required.

Extraction of plant material

50g of the dried ground leaves were extracted in soxhlet sequentially in 300ml of methanol, ethanol, acetone, hot water and cold water. The process was run for 48 hrs at 31°C after which the extracts were distilled and stored in refrigerator for the analysis.

III. METHODS

The dried leaves and extracts of the plant were analysed for phytochemical constituents and antimicrobial activities using standard methods [4].

IV. RESULTS

The results of the test activities and analysis of the bioactive constituents present in the leaves extract of *vitex doniana* are given in Table 1-5

Table 1: Result of phytochemical Screening of the Leaves of *Vitex doniana*.

| Test | Methanol | Ethanol | Acetone | Hot H ₂ O | Cold H ₂ O |
|---------------|----------|---------|---------|----------------------|-----------------------|
| Alkaloids | +++ | ++ | ++ | ++ | + |
| Glycosides | + | + | + | + | - |
| Tannins | + | + | + | ++ | + |
| Saponins | - | + | + | ++ | - |
| Flavonoids | + | + | - | + | + |
| Carbohydrates | + | + | + | ++ | ++ |
| Proteins | + | + | + | ++ | ++ |

+++ : Present in large amount of concentration

++ : Moderately present

+ : Present in small amount of concentration

- : Not present

Table 2: Result of Zone of Inhibition of Micro-organisms by the Leaf extract in (mm)

| Solvent | E. coli | S. Aureus | Aspergillus | B. subtilis | S. Typhimurium |
|------------|---------|-----------|-------------|-------------|----------------|
| Methanol | 14.41 | 10.24 | - | 3.47 | 10.39 |
| Ethanol | 13.69 | 9.88 | - | 2.24 | 12.05 |
| Acetone | 17.15 | 10.41 | 1.38 | 3.72 | 19.59 |
| Hot water | 9.41 | 5.10 | - | - | 14.59 |
| Cold water | 5.05 | 3.6 | - | - | 5.00 |

Table 3: Result of Minimum Inhibitor Concentration of Leaf Extract on Test Organisms in (mg/ml)

| Test organisms | Methanol | Ethanol | Acetone | Hot water | Cold water |
|----------------|----------|---------|---------|-----------|------------|
| E. coli | 6.14 | 6.15 | 0.67 | 49.90 | 99.90 |
| Staphy. Aureus | 12.41 | 49.90 | 12.41 | 99.90 | 199.90 |
| B. subtilis | 99.90 | 199.91 | 12.41 | - | - |
| S. T. | 13.03 | 16.16 | 1.45 | 1.48 | 49.90 |

Table 4: Result of Minimum Bacterial Concentration of Leaf Extract in (mg/ml)

| Test organisms | Methanol | Ethanol | Acetone | Hot water | Cold water |
|----------------|----------|---------|---------|-----------|------------|
| E. coli | 4.90 | 99.90 | 3.025 | 399.90 | 399.90 |
| Staphy. Aureus | 99.90 | 99.90 | 99.90 | 1600.40 | 1599.90 |
| B. subtilis | 799.90 | 1599.90 | 399.90 | - | - |
| S. T. | 12.40 | 49.90 | 6.15 | 24.91 | 799.90 |

V. DISCUSSION

The phytochemical analysis carried out on the leaves of *Vitex doniana* showed the presence of flavonoids, alkaloids, saponins, tannins, glycosides, protein and carbohydrates and this phytochemicals are bioactive compounds found in plants that works with nutrient and dietary fibres to protect against diseases. The presence of saponins has been found to be used in the treatment of hyperglycaemia, it also explains why the leaves are used traditionally to clean and purify blood. It also prevents damage caused by antioxidants by

neutralizing them [10 and 11]. Vascular health studies showed that tannins suppress production of the peptides that are responsible for hardening arteries, they are antimicrobial and have shown antiviral and antibacterial properties [1]. The antimicrobial screening of the plant showed that the plant extract have a strong inhibitory effect against the test organisms used confirming the use of the leaves in the treatment of diseases like diarrhoea, typhoid fever [1] etc.

Conclusively, from the above observations *Vitex doniana* is found to have antibacterial effect, it is therefore paramount to say that the plant can be harnessed thereby manufacturing new drugs from them and since microorganisms tends to have resistance against common antibiotics in use in our society today, more research needs to be done in order to produce an alternative. In addition, the dosage and toxicology effect should be investigated extensively.

REFERENCES

- [1]. Akinpelu D.A., Onakoya T.M (2006). Antibacterial activities of medicinal plants used in folklore remedies in South Western African. *J. Biotechnology* 5: 107-108
- [2]. Borris, R.P., 1996. Natural products research perspectives from a major pharmaceutical company. *J. Ethnopharmacol.*, 51: 29-38.
- [3]. FAO "Some Medicinal forest plant of Africa and Latin America" *Journal of Science* Volume 67: 75-78, 161-162
- [4]. Harborne, J.B., (1998) 'Phytochemical Methods'. A guide to modern techniques of plant analysis 3rd edn. Chapman and Hall, New York, Pp. 1-150
- [5]. Ndukwe. E (2003): Nasal Activity and Anti-inflammatory Effect of Medicinal plant consumption. *Journal of plant Nutritional Revolution*, vol. 48: 111-113.
- [6]. Nigerian Institute of Pharmaceutical Research & Development (NIPRD, 1993). A Phytochemical Test Procedure. Department of Medicinal Plants and Traditional Medicine. Abuja.
- [7]. Okwu, D.E and C. Josiah, 2006., Evaluation of the chemical composition of Nigerian medicinal plants. *Afri. J. Biotech.* 5, Pp. 357 - 361
- [8]. Pietta P.G (2000): Flavonoids as anti-oxidants, *J Nat prod*; 63,Pp. 1035-1042.
- [9]. Harborne, J.B., (1998) 'Phytochemical Methods'. A guide to modern techniques of plant analysis 3rd edn. Chapman and Hall, New York, Pp. 1-150.
- [10]. World Health Organization, Quality Control Methods for Medicinal Plant Materials, WHO, Geneva, 1998.
- [11]. Shri Sawhney, R.C. 1976. Verbenaceae- *vitex negundo*. In Y.R. Chandha (Ed).The wealth of India- Raw Materials: CSIR pubOrwa C, A Mutua, Kindt R , Jamnadass R, S Anthony. 2009 Agroforestry Database:a tree reference and selection guideversion 4.0(<http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp>)lication, India, vol X: Sp-w. pp. 520-524.