Phytochemical Screening and Elemental Analysis of Leaf Extract of *Vernoniaamygdalina* (Bitter Leaf)

Abbas Ibrahim*[1], Saratu Yakubu[2], Alhassan Ketim[3]

[1-3]*Department of Chemistry, Bauchi State University, Gadau P.M.B 65, Itas/Gadau, Bauchi State, Nigeria*

***Abstract*: - Phytochemicals are naturally occurring organic compounds present in all parts of plants, which together with nutrients and fibres provide protection to human being against diseases. In this research work, extracts of *VernoniaAmygdalina* leaves were prepared in n-hexane, petroleum ether, diethyl ether, acetone, chloroform, ethanol, and water using cold maceration technique and the extracts obtained were screened qualitatively for some secondary metabolites. Some macro elements (Na, K, Ca, Mg, P), which are essential for maintaining human health, were also determined quantitatively in the leaves. Findings revealed that alkaloids, flavonoids, steroids, terpenoids, phenols, saponins tannins and cardiac glycosides were present in the leaf extracts, depending on the solvent used for the extraction. Findings also showed that 0.616% Na, 0.274% K, 0.004 % Ca, 0.059% Mg and 0.800% P were present in the leaves of *VernoniaAmygdalina.* This research concludes that *Vernonia Amygdalina* leaves possess some vital phytochemicals that can be used medicinally and essential macro elements that are needed for good healthy living. The study thus provides further evidence on the traditional usage of this plant extract in treating diseases.**

Keywords: **extract, phytochemical, medicinal plant, macro-elements, organism**

I. INTRODUCTION

Plants are important source of drugs; especially in traditional medicine (*Hamid el al*., 2010). It is a common practice in Nigeria and other parts of the world to used plant as crude extracts, decoction, infusion, to treat common infection and chronic conditions. According to WHO, over 70% of the world population rely on medicinal plants for primary health care and there are report from various researches on natural substances of plant origin which are biologically active with desirable and antimicrobial activity [1,2]. A medicinal plant is plant that is used to attempt to maintain health, to be administered for a specific condition, or both, whether in modern medicine or in traditional medicine. Plant can cause adverse effects and even death, whether by side-effects of their active substances, by adulteration or contamination,by overdose,or by inappropriate prescription. The active principal of many drugs found in plants are phytochemicals [3]. The medicinal value of these phytochemicals are because of the present of chemical substance that produces definite physiological action on human body. Some of the valuable one include; Alkanoids, flavonoids, steroids, Terpenoids, phenols, saponins, ternins, and cardiac glycosides for cell growth and replacement, and body building [5].

During the last two decades, the development of drug resistance as well as the appearance of undesirable side effects of certain antibiotics has lead the search for new antimicrobial agents mainly among plant extract with goal to discover new chemical structures, which overcome the above disadvantage[6]. Current research on natural molecule and products primarily focuses on plant since they can be sourced more easily and selected based on their ethno-medicinal uses [7,8]. Vernoniaamygdalina, a member of the Asteraceae family, is a widely used local vegetable in Nigeria, Uganda and other African countries. It grows in a range of ecological zones in Africa and the Arabian Peninsula. The leaf is commonly called "bitter leaf" in English, "Ilo in Igala" "Ewuro" in Yoruba, "Shiwuaka" in Hausa. It is used in various food preparations and in ethnomedicine for the treatment of malaria and gastrointestinal infections. It is a shrub of 2-5m tall with petiolate leaves of about 6.0mm wide [9]. It is up to 20 cm long and its bark is rough. The bitter taste of the leaf has been attributed to the presence of anti-nutritive principles like alkaloids, flavonoids, steroids, saponins, tannins, phenols and cardiac glycosides. There have been several reports on its antimicrobial, antiplasmodial, antitumor, antioxidant and antihelminthic properties [10]. Aqueous leaf extracts of ***V. amygdalina*** have been previously reported to have prebiotic properties [11].

II. EXPERIMENTAL SECTION

Materials

The *Vernoniaamygdalina* leaves were collected from Misau Bauchi state. The plant materials were washed with distilled water to eliminate dust and other foreign particles. The leaves were dried under shade for two weeks in a dust free environment and the sample was grinded into powder using a well cleaned mortar and pestle. Then sieved to removed fibers and large debris.

Preparation of Leaf Extracts

50 g of powdered leaves were separately soaked in 500ml conical flask with 250ml n-hexane, petroleum ether, diethyl ether, acetone, chloroform, ethanol, and water)as the extraction solvents. The different extracts were filtered in different beakers and the filtrates were then evaporated to dryness on water bath at 60 ºC [12]. Chemicals used were of LR and AR grade

Phytochemical Screening

The preliminary phytochemical analysis of the crude extracts of leaves of Vernoniaamygdalina were carried out according to the method described by [13].

Macro element analysis

Macro elements such as Sodium, Potassium, Calcium, Magnesium and Phosphorus were estimated using Atomic Absorption Spectrophotometry (AAS).

III. RESULTS AND DISCUSSION

Qualitative phytochemical analysis

The preliminary phytochemical analysis of leaf extracts of *V. Amygdalina* is presented in Table 4.1. The results shown in Figure 4.1 indicate that while flavonoids, steroids and cardiac glycosides are present in n-hexane extract, only steroid is detected in petroleum ether extract. Table 4.1 also shows that diethyl ether extract contained steroids, cardiac glycosides and tannins while chloroform extract contained steroids and cardiac glycosides only. Table 4.1 also shows that while flavonoids and polyphenols were detected in acetone, ethanol and water extracts, tannins and steroids were detected in only ethanol extract and water extract respectively.

Phyto chemicals such as alkaloids, flavonoids, steroids, cardiac glycosides, phenols, saponins and tannins present in different extracts exhibit a number of biological activities and protect from most of the chronic diseases. Alkaloids have various pharmacological effects such as analgesic, antitumor, antihypertensive, antipyretics, antimalarial, stimulant, anti-HIV, antileukmic and many more and often used asmedications and recreational drugs[14]. Flavonoids are the most common group of polyphenolic compounds in the human diet and are found ubiquitously in plants. The pharmacological effects of flavonoids include CNS activity, cardiotonic, lipid lowering, antiulcer, hepatoprotective, anti-inflammatory, antineoplastic, antimicrobial, antioxidant and hypoglycemic activity. Dietary intake of flavonoids containing foods potentially lowers the risk of certain free radical related pathophysiology .Steroids are pharmalogically active compounds and show the analgesic properties. Thesteroids also exhibit central nervous system activities [15,16].Cardiac glycosides are also of medicinal importance and used in the treatment of congestive heart failure and cardiacarrhythmia. Phenols and phenolic compounds have tremendous antimicrobial potential. They have been extensively used in disinfections and remained the standards with which other bactericides are compared (. They have been reported to exhibit cellular defense mechanism in atherogenesis and cancer. A wide range of phenolic substances show strong antioxidant and antimutagenic activities. As per recent evidences, phenolic compounds could also play an essential health promoting role. Saponins are being promoted commercially as dietary supplements and nutraceuticals in traditional medicine preparations. They also possess hypocholesterolemic and antidiabetic properties. Certain tannins (ellagitannins from *Lagerstroemia speciosa*) stimulate glucose uptake. They exhibit insulin like activity acting as glucose transport activators of fat cells [17-20].

Macro elements Analysis

The results of macro elemental analysis in the leaves of *VernoniaAmygdalina* are presented in Table 4.2. As shown in Table 4.2, the macro elemental composition of the leaves of *VernoniaAmygdalina* decreases in the following order: phosphorus (0.800 %), sodium (0.616 %), potassium (0.274 %), magnesium (0.059 %), and calcium (0.004 %). The results just presented indicate that leaves of *VernoniaAmygdalina* contained adequate amount of macro elements.

Table 4.1: PHYTOCHEMICAL CONSTITUENTS in the LEAF EXTRACT of *VERNONIAAMYGDDLINA*

Phytochemical Constituent	**Extracting solvent**						
	n-Hexane	Pet. Ether	Diethyl ether	Chloroform	Acetone	Ethanol	Water
Alkaloids	-	-	-	-	+	-	-
Flavonoids	+	-	-	-	+	+	+
Steriods	+	+	+	+	-	-	+
Saponins	-	-	-	-	-	+	-
Polyphenols	-	-	-	-	+	+	+
Cardiac Glycosides	+	-	+	+	-	-	-
Tannins	-	-	+	-	-	+	-

Table 4.2: PROPORTION of MACRO ELEMENTS in the LEAVES of *VERNONIAAMYGDDLINA*

Element	Proportion (%)
Na	0.616
K	0.274
Ca	0.004
Mg	0.059
P	0.800

V. CONCLUSION

Phytochemical screening and macro elemental analysis of *VernoniaAmygdalina* were investigated in this research work. Findings revealed the presence of important secondary metabolites in the leaves. Considerable amount of macro elements were also present in the leaves. Variations of phytochemical parameters present in medicinal plant depend on solvents used for extraction. It is concluded that *VernoniaAmygdalina* leaves possess some vital phytochemical components that can be used medicinally. The study thus provides further evidence on the traditional usage of this plant extract in treating diseases.

Recommendation

On the basis of the findings obtained in this research project, the following recommendations are offered:

- Further study is necessary to isolate and characterize the secondary metabolites detected in this research work
- Further research needs to be carried out to evaluate the biological activity of the plant investigated in this research work against a wider group of pathogens including bacteria, fungi, and parasites
- Finally, the traditional medicine practitioners, herb users, herb sellers and health institutions should be using the results of research work in order to understand the health and economic importance of *VernoniaAmygdalina* leaves.

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