EXCELLENT PUBLISHERS

International Journal of Current Research and Academic Review

ISSN: 2347-3215 Volume 3 Number 11 (November-2015) pp. 60-65

www.ijcrar.com

Analysis of Chemical Composition of Leaves and Roots of *Ageratum conyzoides*

K. N. Agbafor[1]*, A. G. Engwa[2] and I. K. Obiudu[2]

[1]Biochemistry Department, Ebonyi State University, Abakaliki, Nigeria
[2]Chemical Sciences Department, Godfrey Okoye University, Enugu, Nigeria

Corresponding author

KEYWORDS

Phytochemicals, Proximate composition, Minerals, Vitamins, *Ageratum conyzoides*

A B S T R A C T

Ageratum conyzoides has been utilized by herbal medicine practitioners in Eastern Nigeria intreatment and management of several disorders, such as; diabetes, inflammations, spasm, headaches, cancers, among others. The basis of these applications has not been well investigated. This present research studied the phytochemical, proximate, mineral and vitamin composition of leaves and roots of the plant. The chemical analyses were done according to standard procedures. Alkaloids, flavonoids, saponins, tannins, cardiac glycosides and anthraquinones were detected in both samples, while terpenoids were present in the leaves only. The values of these phytochemicals in the leaves were significantly higher ($P<0.05$) than those in the roots. Proximate analysis indicated that the leaves contain edash (12.64%), crude fat (2.27%), fiber (23.50%), moisture (10.02%), crude protein (14.73%) andcarbohydrate (36.84%), while ash (16.95%), crude fat (2.01%), fiber (26.74%), moisture (13.35%), crude protein (9.89%) and carbohydrate (31.06%) were found in the roots. Na, K, Ca, Mg, P, Zn, Mn and Fe were present in the leaves and roots, and their concentrations in roots were significantly higher ($P<0.05$) than in leaves. Both samples were found to contain vitamins B_2, B_6, C, E, thiamin and niacin. Their values in the leaves did not differ significantly ($P> 0.05$) from those in roots. These chemical constituents of leaves and roots of *Ageratum conyzoides* may be responsible their applications in treatment and management of various disorders.

Introduction

The use of plants and their products for different purposes has been with man from the beginning. Aside food, plants are often used as medicine [1][2][3].

All plants produce chemical compounds as part of their normal metabolic activities. These can be divided into primary metabolites such as sugars and fats found in

all plants and secondary metabolites, e.g. alkaloids, tannins, saponins, phenols, etc. These secondary metabolites and other chemical constituents of medicinal plants account for their medicinal value [4]. Medicinal plants often exhibit a wide range of biological and pharmacological activities such as; anti-inflammatory, anti-bacterial and anti-fungal properties [5][6]. Extracts, syrups, infusions and concoctions prepared from different parts of these plants are used to remedy different ailments. Such ailments include; typhoid, anaemia, malaria, headache, etc [7]. In Nigeria many diseases were treated and are still being treated with medicinal plants with success. These diseases include malaria, epilepsy, infantile convulsion diarrhoea, dysentery, bacterial and fungal infections, mental illness, asthma, diabetes, worm infestation, pains and ulcers [8].

*Ageratum conyzoides*belongs to the family of Asteraceae. It is an erect, annual, branched, slender, hairy and aromatic plant which grows to approximately one meterin height. It is a native of central America, Southeast Asia, South China, India, West Africa, etc [1][9]. It has been known since ancient times for its curative properties and has been utilized for the treatment of various ailments, such as burns and wounds, diabetes, headaches, pneumonia, inflammation, asthma, spasmodic and haemostatic diseases, stomach ailments, gynecological diseases, leprosy and other skin diseases [10].

The medicinal applications of various parts of *Ageratum conyzoides* are yet to be fully investigated. In this line of communication, the present research studied investigated the chemical constituents of leaves roots of *Ageratum conyzoides.* The pharmacological significance of the chemical composition has been discussed.

Materials and Method

Collection and Preparation of Plant Materials

Fresh leaves and roots of *Ageratum conyzoides* were collected from Okposi inOhaozara L.G.A of Ebonyi state. The samples were identified and authenticated by Prof. S.C Onyekwelu, a botanist in Applied Biology Department of Ebonyi State University, Abakaliki. They were air-dried and ground into a powder which was stored in an air-tight contain.

Measurement of Phytochemicals

Qualitative determination of saponins, alkaloids, tannins, cardiac glycosides, terpenoids, flavonoids and anthraquinones was carried out on the extracts using the method described by Sofowora[11]. The quantitative measurement of the phytochemicals was done according to standard procedures of Trease and Evans [12] and Harbone [13].

Proximate Analysis

Proximate analysis was carried out according to the procedure of Association of Official

Analytical Chemists [14]. This constitutes the class of food present in samples such as carbohydrate, protein, fat, fibre, ash content and moisture content.

Determination of Mineral Composition

The extracts were incinerated into ash, dissolved in 1ml of 2M HCl and diluted to 100ml with deionized water. The resulting solution was used for the determination of Na, Ca, Mg, Mn, Fe, Zn, K, Cr and Cu using atomic absorption spectrophotometer (Buck

scientific AAS 200 A) [15]. Phosphorous was measured by the vanadiumolybdate colorimetric method of Pearson [16].

Measurement of Vitamin Content

The levels of vitamins A, K, thiamin, C, B_1, B_2, B_6, E and niacin in the extracts were determined according to the methods described by Okwu and Ndu [17].

Statistical Analysis

Data generated were expressed as mean ± SD. Statistical significance of difference was determined using the program SPSS 12 (SPSS, USA) by performing one-way ANOVA with post-hoc comparisons between the control group and each of the treated groups by Ducan's multiple comparison test. A p-value less than 0.05 was considered statistically significant.

Result and Discussion

The results of the phytochemical screening are presented in table 1. Alkaloids, tannins, saponins, cardiac glycosides, anthraquinones and flavonoids were found in the leaf and root samples, while the presence of terpenoids was detected in the leaves only. This is consistent with the findings of Duruet al [18]. The concentrations of the phytochemicals in the leaf sample were significantly higher ($P<0.05$) than those in the roots. The medicinal uses of *Ageratum conyzoides* may bepartly attributed to the identified constituent phytochemicals. Alkaloids have analgesic effects [17]. Morphine alkaloids are powerful pain relievers and narcotics (induces sleep or drowsiness). Atropine, cocaine and other alkaloids are known stimulants of the central nervous system [19]. Tannins prevent urinary tract infection by preventing bacteria from adhering to the walls. Tannins have been shown to be useful in the management of HIV infection and herpes. Combination of tannin and anthocyanins can breakdown cholesterol in the bloodstream and in atherosclerotic plaques. Tannins, along with vitamin C help build and strengthen collagen [20]. Saponins serve as natural antibiotics, which help the body to fight infections and microbial invasions. They also enhance the effectiveness of certain vaccines, lower cholesterol and knock out some tumor cells, particularly lung and blood cancers [17]. Flavonoids act as antioxidants in biological systems. Other properties of flavonoids include protection against allergies, inflammation, free radicals, platelet aggregation microbes, ulcers, hepatoxins, viruses and tumors [17]. The other phytochemicals have various health implications.

The proximate composition of the leaves and roots, shown in table 2, revealed that the leaf sample contained ash (12.64%), fat (2.27%), fiber (23.50%), moisture (10.02%), protein (14.73%) and carbohydrate (36.84%), while ash (16.95%), fat (2.01%), fiber (26.74%), moisture (13.35%), protein (9.89%) and carbohydrate (31.06%) were found in the roots. The relatively high fiber and low fat contents may be an important contributing factor to some the medicinal applications of the plant. According to Okaka*et al*[21],clinical studies suggest fiber can exert a wide range of benefits in areas such as bowel function, gut health, immunity, blood glucose control, and serum lipid levels.

Na, K, Ca, Mg, P, Zn,Mnand Fe were present in the leaves and roots in proportions comparable to those of some investigated medicinal plants (table 3), and their concentrations in roots were significantly higher ($P<0.05$) than in leaves. These minerals play significant roles in several biological processes.

Table.1 Phytochemical composition of leaves and roots of Ageratum conyzoides

Pyhtochemicals	Leaf (mg/100g)	Root (mg/100g)
Alkaloids	26.80± 1.08[a]	13.04 ±1.14[d]
Flavonoids	21.24± 1.85[a]	9.50± 2.09[d]
Tannins	4.78± 0.31[b]	2.05± 0.65[e]
saponins	3.16 ± 0.55[b]	2.02±0.12[e]
Cardiac glycosides	3.05 ± 0.28[b]	1.60± 0.45[e]
Terpenoids	0.84 ± 0.06[c]	nil
Anthraquinones	0.79± 0.11[c]	0.34± 0.09[f]

Values are mean ± SD; n = 3. Values with different superscripts are significantly different (P<0.05)

Table.2 Proximate composition of dried leaves and roots of Ageratum conyzoides

Component	Leaf (%)	Root (%)
Crude carbohydrate	36.84[a]	31.06[a]
Protein	14.73[b]	9.89[b]
Fibre	23.50[c]	26.74[c]
Fat	2.27[d]	2.01[d]
Ash	12.64[b]	16.95[b]
moisture	10.02[b]	13.35[b]

Values are mean ± SD; n = 3. Values with different superscripts are significantly different (P<0.05)

Table.3 Mineral constituents of dried leaves and roots of Ageratum conyzoides

Minerals	Leaf (mg/100g)	Root (mg/100g)
Ca	48.35± 1.22[a]	65.10± 1.02[m]
Na	118.54±1.52[b]	152.13±1.30[n]
Mg	10.75±0.93[c]	21.67±1.15[f]
K	0.68± 0.02[d]	1.64 ± 0.11[i]
Zn	0.08± 0.002[e]	0.15 ± 0.001[k]
P	25.25±1.21[f]	48.52± 1.33[a]
Fe	0.04± 0.001[g]	0.09± 0.001[e]
Mn	1.02 ± 0.03[h]	2.11 ± 0.02[l]
Cu	ND	ND
Cr	ND	ND

Values are mean ± SD; n = 3. Values with different superscripts are significantly different (P<0.05). ND = not detected

Table.4 Vitamin content of dried leaves and roots of Ageratum conyzoides

Vitamin	Leaf (mg/100g)	Root (mg/100g)
Thiamin	0.73 ± 0.10^{a}	0.64 ± 0.06^{a}
B_2 (riboflavin)	28.47 ± 1.21^{b}	20.45 ± 0.11^{b}
B_6 (Pyridoxine)	95.56 ± 1.13^{c}	81.78 ± 1.10^{c}
C (Ascorbate)	108.11 ± 0.55^{c}	94.65 ± 1.13^{c}
E (Tocopherol)	36.67 ± 0.35^{b}	25.64 ± 1.02^{b}
Niacin	64.42 ± 1.35^{d}	57.55 ± 0.86^{d}
A	ND	ND

Values are mean ± SD; n = 3. Values with different superscripts are significantly different ($P<0.05$). ND = not detected

Bone growth and turnover are influenced and regulated by the metabolism of Ca, phosphate and Mg; Fe is important in the formation of haemoglobin. Mg and K are also involved in inducement of calmness [22]. The presence of Zn in the extracts may further explain the utilization of the leaves in wound healing. Zn has inhibitory effect on bacterial growth, and is involved in immune response. There is increased demand for Zn during cell proliferation and protein synthesis [23].

Both samples were found to contain vitamins B_2, B_6, C, E, thiamin and niacin (table 4). Their values in the leaves did notdiffer significantly ($P> 0.05$) from those in roots.The presence of the observed vitamins in the samples is a boost to their therapeutic potentials. Vitamin B_6 (pyridoxine) helps in the breakdown of blood sugar, and dilation of blood vessels [24]; vitamin B_2 (riboflavin) is essential for energy production and in its coenzyme forms (FMN and FAD), serves as hydrogen transport systems; vitamin C, an antioxidant, facilitates wound healing, production of collagen, formation of red blood cells and boosts immune system; vitamin E is an antioxidant and plays a role in cellular respiration; niacin (nicotinic acid) is converted to NAD and NADP, which are coenzymes for various oxidoreductases [22].

Conclusion

Alkaloids, flavonoids, tannins, saponins, cardiac glycosides and anthraquinones are contained in the leaves and roots of the plant, while terpenoids occur in the leaves only. The leaves and roots also contain minerals, vitamins and other compounds of known pharmacological activity.

The various medicinal uses of leaves and roots of *Ageratum conyzoides* may be due to these chemical constituents present in them. Studies on the efficacy of extracts of the leaves and roots against some of disease conditions, as claimed by traditional medicine practitioners, are in progress in our laboratory.

References

1. Iwu, M. M. (2000). Food for medicine: Dietary plants and Masticatories as Sources of Biologically active Substances. University of Ife, Nigeria. Ife Press. pp. 303-310.
2. Ogunkunle, A. T.J. and Tonia, A. L(2006). Plant and their Natural

Pharmacological Effects. *African Journal of Biotechnology*. 5(21): 2020-2023.

3. Devendran, G and Balasubramanian, U. (2011). Uses of Medicinal Plants. *Asian Journal of Plant Science and Research,* 2 (4):44-48.
4. Varadarajan, P., Rathinaswamy, G. and Asirvatahm, D. (2008). Antimicrobial Properties and phytochemical Constituents of Rheo discolor, *Ethnobotanical leaflet* 12: 841 – 845.
5. Okwu, D. E., and Ekeke, O. (2003). Chemical Profile Analysis of Medicinal Plants. *International Journal of Pure and Apllied Science.*23(9): 235-238.
6. Oladejo, O.W, Imosemi, I.O, Osuagwu, F.C, Oluwadara, O.O, Aiku, A, Adewoyin, O, Ekpo, O.E.,Oyedele,O.O. and Akang, E.E.U. (2003) Chemical Profile Analysis of Medicinal Plants. *African Journal of Biomedical and pharmaceutical science*. 3(8): 27-31.
7. Okwu, D. E. (2005). Chemical Profile Analysis. *International Journal of Molecular Medicine and Advance Science*, 25(4): 375-381.
8. Sofowora, A. E. (1986). The state of medicinal plants in Nigeria, University of Ibadan, Nigeria, Press 66 – 80.
9. Prince, L and Prabakaram, P. (2011). Chemical Profile Analysis of Medicinal Plants. *Asian Journal of Plant Science.* 20(1): 1-8.
10. Kamboj, A. andSaluja, A. K. (2008). *Ageratum conyzoides* L.: A review on its phytochemical and pharmacological profile. *Int J Green Pharm*;2:59-68.
11. Sofowora, A. (1993). The state of Medicinal plants in Nigeria. 3rd edition, University of Ibadan, Nigeria,
12. Trease, G. E. and Evans, W. C. (1983). Textbook of Pharmacognosy. 12th ed. Tindall and Co. London 343 – 383.
13. Harborne, I. B. (1973). Phytochemical Methods: A guide to modern Techniques of plant analysis 2nd ed. Chapman and Hall, New York, 88 – 185.
14. AOAC, 1990. Official methods of analysis. Association of Official Analytical Chemists, Washington D.C. 15th, Ed.
15. Igwe, C. ,Nwaogu, L. A, and Ujuwondu, C. O. (2007). Assessment of hepatic effects, phytochemical and proximate composition of *phyllanthusamarus. Afr. J. Biotech*. 6(6): 728 – 731.
16. Pearson, D. (1976). The chemical analysis of foods, 17th ed. Churchill Livingstone, London. 3 – 4.
17. Okwu, D. E. and Ndu, C. U. (2006). Evaluation of the phytonutrients, mineral and vitamin contents of some varieties of yam. *Int. J. Mol. Med. And Advance Sci.* 12(2): 199 – 203.
18. Amadi, B. A., *Duru, M.K.C., and Agomuo, E.N. (2012). Chemical profiles of leaf, stem, root and flower of *Ageratum conyzoides.Asian Journal of Plant Science and Research*, 2 (4):428-432
19. Teguja, M. N. and Omak, K. U. (1993). Encyclopedia of medicinal plants. *J. Biochemical Sciences*,20: 81 – 82.
20. Okuda, T., Matsuda, Y., Yamanaka, A. and Sagisaka S. (1991). Abrupt increase in the level of hydrogen peroxide in leaves of winter wheat is caused by cold treatment. *Plant Physiology*, 97,1265–1267.
21. Okaka, J. C., Akobundu, E. N. T. and Okaka, A. N. C. (2006). Food and Human Nutrition OCJ Academic Publishers, Enugu, Nigeria 135 – 150, 104 – 129.
22. Burtis, C. A. and Ashwood, E. R. (2003). Tietz Fundamentals of Clinical Chemistry, 5th ed. Elsevier Pub. India.
23. Williams, L. and Leaper, D. (2005). Nutrition and Wound Healing. *Clinical Update*, 5(1): 3 – 5.
24. Trumbo, P. (2014). Pantothenic Acid. In: Modern Nutrition in Health and Disease. 11th Edition. Eds Ross AC, Caballero B, Cousins RJ, Tucker KL and Ziegler TR. Lippincott Williams & Wilkins, Philadelphia, USA, 351-357.