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Phytochemical Analysis of *Polyalthia Longifolia* (Fresh Leaves)

Chioma, Donlawson[1] and Reminus, Okah[2]*

[1]Department of Chemistry Rivers State University Nkpolu Oroworukwo, Port Harcourt, Rivers State, Nigeria.
[2]Department of Science Laboratory Technology, Port Harcourt Polytechnic Rumuola, Port Harcourt, Rivers State, Nigeria.
Corresponding Author Email: ogweru12345@gmail.com

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ABSTRACT: The Polyalthia longifolia plant is a significant source of phytochemicals, which are chemicals produced by plants through metabolism. Analysis of its leaves using standard procedures shows that it contains saponin, flavonoid, alkaloid, hydrogen cyanide, total phenol, and terpenoids. The presence of these phytochemicals contributes to the nutritive and medicinal potency of the plant. The phytochemicals study of the plant reveals that the plant is particularly rich in saponin 3.21, flavonoid 7.14, alkaloid 4.84, Hydrogen cyanide 1.73, total phenol 2.96 and Terpenoids 4.11. These compounds have several benefits, including anti-cancer, anti-oxidants, and anti-haemorrhoids properties. Additionally, the plant can be used to reduce fibroids and is applicable industrially as food preservatives, cosmetics, and sweeteners. While the presence of hydrogen cyanide in the plant leaves may be a concern for some, the levels detected are not significant enough to have any lethal effect. Moreover, the compound can easily be detoxified. In conclusion, Polyalthia longifolia is a highly beneficial plant due to its rich content of phytochemicals. Its applications in medicine and industry make it a valuable resource.

Keywords: Polyalthia longifolia saponin. hydrogen cyanide, total phenol and terpenoids

INTRODUCTION

Polyalthia longifolia is originally known as Green Champa which is an evergreen plant, native to India, commonly planted due to its effectiveness in alleviating noise pollution(Fahey and Jed, 2005). These plants are widely spread in Africa, Asia, Australia, tropical America and India. Reports showed that they contain phytochemicals like terpenes, carotenoids, tannins, alcohols, ketones, aldehyde, esters, alkaloids, flavonoids and saponins among others at different concentrations which may be influenced by their geographical locations and content of soil on which the plants are grown. It is mainly used for landscaping purposes because of the exquisite beauty of its leaves arrangement and the unique height of the plant itself. Polyalthia longifolia has been of medicinal in nature and a typical example is of the bark extract which is used in some parts of the west coast of Africa. In Coted'ivoire particularly, it can be used for the treatment of haemorrhoids and fibroid,(Frank and Vertkaik,2006) the leaf oil has been demonstrated to exclusively compose of sequiterpene derivatives while the leaf is used in Nigeria and elsewhere for treatment of skin diseases, fever, diabetes and hypertension. Polyalthia longifolia is popularly rich in minerals, vitamins, proteins, fibres and other substances which promote a healthy life. The leaves and the roots are a major sources of vitamins E and B, dietary fiber, essential elements calcium and magnesium, monounsaturated fatty acids, and phytosterols with significant cholesterol-lowering effects (Hossein, 2008). It is one of the most popular in nutritive food that can relieve different kinds of ailments. This review summarizes recent advances in the studies regarding this plant and its potential significances. The phytochemicals analyzed were found to be some of the parameters in this plant which has made it very useful to man and his environment (Forster and Hartonut, 2006). Some of the phytochemicals determined were saponin, flavonoid, cyanogenic glycoside and alkaloid using the leaves. This has also shown that some parts of the plant

are very edible and can be properly digested, also its usefulness for good health (Frank and Vertkaik, 2006), they are majorly used for food, medicinal and industrial purposes (Lateef et al, 2015). It is cultivated to use as a vegetable (leaves, green pods, flowers), for spice (Azeez et al., 2015), (mainly roots) for cooking and cosmetic oil and as a medicinal plant (all plant organs). Medicinally, the parts are used for treatment of anaemia, anxiety, asthma, fever, semen deficiency (Frank and Vertkaik, 2006).

Nutritionally, Polyalthia longifolia have been used to combat malnutrition, especially among infants and nursing mothers (Lindhorst, 2007; Ted and Elevitch, 2010). It has high anti-oxidant properties making it a valuable source of vitamins A, C and E. it is one of the highest naturally occurring sources of anti-oxidants. (Hossein, 2008). The review aims to renew the interest in this promising plant, thus stimulating researchers to go further with the study for discovering novel medicinal and nutritional benefits.

MATERIAL AND METHODS

Materials

Leaves of Polyalthia longifolia were freshly collected and sent to End-point Laboratories and Equipment Agip, Rivers-State Nigeria. All determinations were then carried out in triplicates using standard methods of analysis.

Methods

The phytochemical analysis of saponins, flavonoids, alkaloids, total phenols, and were determined using the method of AOAC ,(2006) with the absorbance measured using spectrophotometer.

Sample preparation and extraction

The fresh Polyalthia Longifolia leaves upon arriving the laboratory were first washed with water to remove any trace of dirt. The leaves were then chopped into small pieces using electric blender. 100g of the processed sample was weighed and soaked in 500ml of 50% methanol (1:1 vol/vol absolute methanol: distilled water) in a clean flat bottomed flask for 48hours. The flask with the mixture was accompanied with intermittent stirring and agitation during the 48hours period. The mixture was then subjected to filtration using Whatman No. 1 filter paper. The resulting filtrate was evaporated on water bath at 60^{o}C and allowed to concentrate. The resulting concentrates were regarded as the crude methanol and water extracts. The extract was used for the determination of the phytochemicals properties of the leaves.

Flavonoids

Procedure

The total flavonoids content of the *L. Polyathia* leaves extract was determined by (AOAC, 2006). I.0ml of the sample extract was mixed with 4ml of distil water and 0.30ml of 10% sodium nitrate ($NaNO_3$) was added. After 5 minutes, 0.30ml of 10% Aluminium chloride ($AlCl_3$) solution was added followed by 2.0ml of 1% NaOH solution. The mixture was thoroughly mixed and absorbance was then read at 510nm using Axiom UV spectrophotometer. To quantify the amount of flavonoids in the sample, standard curve of quercetin was prepared and the results were expressed as quercetin equivalents (mg quercetin/100g of sample).

Saponins

Procedure

The saponins content of the L. polyalthia leaves extract was determined by using spectrophotometric method. 0.2ml of the sample extract was mixed with 0.2ml of vanillin reagent (8% vanillin in ethanol) and 2.5ml of 72% aqueous sulphuric acid in a test tube. The resultant mixture was thoroughly mixed and heated for 10minutes in a water bath at 60^{o}C. The test tube containing the mixture was cooled in an ice bath and allowed to attain room temperature. The absorbance was then read at 544nm using Axiom UV-Vis spectrophotometer, and total saponins content of the sample was expressed as standard saponin equivalent in mg/100g of sample weight.

Total phenols

Procedure

The total phenolic content of the *L. polyalthia* leaves extract was determined by Folin Ciocalteu method. 0.2ml of the sample extract was mixed with 0.2ml of Folin-Ciocalteu reagent and 0.8ml of 2% sodium carbonate was added after standing for 5minutes. The mixture was thoroughly mixed and allowed to stand for 30minutes at room temperature. Absorbance was then read at 760nm using Axiom UV spectrophotometer. To quantify the amount of total phenols in the sample, standard curve of gallic acid was used as a standard and the total phenolics were expressed as gallic acid equivalents (mg GAE /100g of sample

Alkaloids

Procedure

The alkaloid content of the *L. Polyalthia* leaves extract

Table 1.0 Phytochemical resuit

S/N	Parameters	Methods	P. Longifolia leaves (fresh) mg/100mg
1	Alkaloid(mg/100g	spectrophotometric method	4.84
2	Saponin (mg/100g)	spectrophotometric method	3.21
3	Flavonoid (mg/100g)	AOAC, 2006	7.14
4	Total phenol (mg/100g)	Folin Ciocalteu method.	2.96
5	Hydrogen Cyanide (mg/100g)	Titrimetric method	1.73
6	Terpenoids (mg/100g)	spectrophotometric method	4.11

was determined by using spectrophotometric method. 1.0ml of the sample extract was mixed with 1.0ml solution of Iron (III) chloride (0.025M of $FeCl_3$ in 0.5M HCl) and 1ml of 0.05M of 1, 10-phenanthroline in ethanol.The resultant mixture formed was incubated for 30minutes in a water bath maintained at 70^{o}C. The absorbance of red coloured complex formed was measured at 510nm against reagent blank. Alkaloid content of sample was separated as quinine equivalent in mg/100g of sample weight

Hydrogen cyanide

Procedure

The hydrogen cyanide content of the *L. Polyalthia* leaves extract was determined by using titrimetric method 10g of sieved sample (sieve No. 20) in 800ml Kjeldahl flask was added 200ml water and allowed to stand for 3hrs. Steam distillation was employed and 155ml was distillated into sodium hydoxide solution (0.5g in 20ml H_2O) and diluted to 250ml. 10ml of the distillate was titrated against 0.02N silver nitrate using micro-burette. End-point was determined at permanent mixture turbidity.

Terpenoids

Procedure

The total terpenoids content of the *L. Polyathia* leaves extract was determined by spectrophotometric method. I.0ml of the sample extract was mixed with 4ml of distil water and 0.30ml of 10% sodium nitrate ($NaNO_3$) was added. After 5 minutes, 0.30ml of 10% Aluminium chloride ($AlCl_3$) solution was added followed by 2.0ml of 1% NaOH solution. The mixture was thoroughly mixed and absorbance was then read at 510nm using Axiom UV spectrophotometer. To quantify the amount of terpenoidoids in the sample, standard curve of quercetin was prepared and the results were expressed as quercetin equivalents (mg quercetin/100g of sample).

RESULT AND DISCUSSION

The phytochemicals analyzed were found to be some of the parameters in P. Longifolia leaves (fresh) which has made it very useful to man and his environment (Table 1) (Forster and Hartonut, 2006). Some of the phytochemicals determined were saponin, flavonoid, Hydrogen Cyanide**,** total phenol, Terpenoids and Alkaloid using the leaves (Fugile and Olson,2010) . This has also shown that some parts of the plants are very edible and can be properly digested, also, its usefulness for good health (Frank and Vertkaik, 2006). Results of some phytochemical analysis of P**.** Longifolia leaves (fresh) are presented in the (Table 1). From our analysis, it shows that phytochemicals; flavonoid**,** terpenoids and alkaloid have high concentrations with flavonoid having a higher concentration in P. Longifolia leaves as analyzed with concentration of 7.14mg. The high concentration of flavonoid in the P. Longifolia leaves is responsible of its naturally bright colouration, fragrance and anti-oxidant properties; it is also interesting to note that The flavonoid concentration makes it more applicable industrially and medically as food supplements. The different parameters determined were variously distributed in the sample as follows, saponin 3.21flavonoid 7.14, alkaloid 4.84,Total phenol 2.96,Terpenoids 4.11 and hydrogen cyanide 1.73, This confirms that the plant leaves are good sources of saponin and flavonoid which contain high amount of lipids. Saponin helps in protecting the plant against microbes and fungi and may also enhance nutrient absorption and aid in animal digestion. The presences of saponins have many health benefits which includes; reduction of blood cholesterol level, cancer and improvement of the immune system (Bohm, and Kocipal-Abyazam, 1999).

The results revealed that the phytochemical parameters analyzed in the sample of P. Longifolia leaves are of good health benefits and therefore, P. Longifolia leaves is a good source of food (Castello et al, 2002). The phytochemical components of P. Longifolia leaves are useful in treating medical ailments like hypertension, cancer, asthma, atherioscleriosis etc. Also act as anti-cancer, anti-allergic, antioxidants, anti-viral and anti-inflammatory effects (Fugile and Olson, 2010). The concentration of hydrogen cyanide in the sample shows that, it is less toxic and will produce a minor quantity of hydrogen cyanide which can easily be detoxified (Brito-Arias, 2007).

Conclusion

The study conducted on the aqueous leaf extracts of P. Longifolia leaves has revealed that the phytochemical components present in them possess antioxidant properties. This finding indicates that these extracts have the potential to be used in drug production. With this discovery, the development of drugs that can combat oxidative stress and its associated health conditions may be possible. The antioxidant property of the extracts may also have other applications in the field of medicine and healthcare. The phytochemicals determined gives the plant its improved quality as a medicinal and nutritive plant. The level of cyanide determined is also an indication that the plant can be used as a good source of food nutrients. Overall, this study offers promising prospects for the use of P. Longifolia leaves in drug production and warrants further research in this area.

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