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Preliminary studies on the phytochemical and proximate compostion of *Catharanthus roseus* (Linn)

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Abstract
Phytochemical and proximate composition of *Catharanthus roseus* was studied. The result revealed the presence of alkaloid, tannin, flavonoid, saponin, glycosides, phenol, anthocyanin and sterol in the leaves and stems. The highest chemical constituent was alkaloid (11.84%) which was found in the leaves, while the least was sterol (0.05%) found in the stem. The highest nutrient content was carbohydrate (56.71) found in the stem and the least was crude protein also found in the stem. The results supported ethno botanical uses of *Catharanthus roseus* as medicine and potentials of the parts as source of food. The high concentration of crude fibre in the leaf, stem and root of *Catharanthus roseus* increases its potentials as laxatives and in reduction of excessive weight. This study has helped to expose the essential bioactive compounds in *Catharanthus roseus*, hence presenting the plant as a reservoir for the treatment of many diseases.

Keywords: Preliminary, *Catharanthus roseus*, Composition, Anthocyanin, Phytochemical, Proximate

1. Introduction

Catharanthus roseus (Linn.) is an evergreen sub shrub or herbaceous plant in the family Apocynaceae. Previous studies conducted on the plant indicated that it contains calcium, potassium, nitrogen, magnesium and phosphorus [1]. These elements are very important to human nutrition. They are required for repair of worn out cells, strong bone and teeth, building of red blood cells, maintaining osmotic balance and for body mechanism [2].

The leaves of *Catharanthus roseus*, long before modern researcher discovered the valuable and variable properties were used for a host of medicinal purposes in India especially in the treatment of wasp sting. In Hawaii, extract of boiled plant was used in arresting bleeding. In Central America, and parts of South America gargle was used to ease sore throats and chest ailments, and laryngitis. In Africa, leaves were used for the treatment of menorrhagia and rheumatism [3, 4].

Phytochemical compounds are products of plants normal metabolic processes. Most of these constituents are potent bioactive compounds found in medicinal plant parts which are precursors for the synthesis of useful drugs [5]. The astringency from tannin is what causes the dry and pucker feelings in the mouth following the consumption of red wine or unripe fruit [6]. Tannin if ingested in excessive quantities inhibits the absorption of minerals such as iron which may, if prolonged, lead to anemia [7].

Alkaloids rank among the most efficient and therapeutically significant plant substances [8]. They are often toxic to man and many have dramatic physiological activities, hence their wide use as medicine for the development of drugs [9, 8]. Flavonoid are widely distributed in plants performing various functions including producing yellow or red (blue pigmentation) in flowers and protection from attack by microbes and insects [10]. They are synthesized by plants in response to microbial infection and have been found in vitro to be effective against a wide array of micro-organisms [9].

2. Materials and Methods

The plant samples (leaves and stem) of *Catharanthus roseus* (L) were collected from Anambra State Commercial Agricultural Market Garden, Amawbia, Anambra State. The samples were authenticated by Mr. AO Ozioko, a consultant taxonomist with the International Center for Ethnomedicine and Drug Development (Inter CEDD) Nsukka Nigeria. The voucher specimen of the plant studied is deposited in the herbarium of the Department of Botany, Nnamdi Azikiwe University, Awka Anambra State Nigeria.

2.1 Preparation of Plant Extract

The leaves and stem of *Catharanthus roseus* was oven dried at 45 ^{o}C. The dried sample was pulverized using automated blender. The pulverized sample was dissolved in 100ml of 70% ethanol and left to stand for 24hours using the batch method of extraction. The sample was filtered with No.42 Whatman filter paper. Standardization was accomplished by evaporating to dryness using rotary evaporator at 40 ^{o}C.

2.2 Phytochemical Analysis

The qualitative and quantitative phytochemical analyses were conducted using standard methods as described by [1, 11].

2.3 Proximate Analysis

Proximate analysis on the leaves and stem of *Catharanthus roseus* was carried out using the methods of [11, 12].

The proximate composition of the sample was determined using the AOAC official methods [11]. Thermal drying method was used in the determination of moisture content of the samples [13]. Moisture was determined by the loss in weight of samples dried in a 105 ^{0}C oven. The percentage moisture content was calculated by computing the loss in weight on drying as a fraction of the initial weight of sample used and multiplied by 100.

$$MC\ (\%) = \frac{W_o}{W_i}\ X\ 100$$

Where:

W_o = Loss in weight (g) on drying and
W_i = Initial weight of sample (g)

The ash content was determined using the ignition method by burning the sample in as muffle furnace at 600 ^{0}C for 2hr. The percentage ash content was calculated using the formula:

$$Ash(\%) = \frac{M_a}{M_s}\ X\ 100$$

Where:

M_a = Mass of ash (g)
M_s = Mass of sample used (g)

Determination of crude protein was done by determining the total organic Nitrogen, using the macro-Kjeldhal method. This involved digestion, distillation and titration. The technique determined the amino nitrogen of the sample, after which the total organic nitrogen was then, calculated using the formula:

$$\%\ TON = \frac{TV \times NE \times TV_d}{Ms \times V_d}$$

Where TV = Titre value, NE = mg nitrogen equivalent to molarity of acid, TV_d= total volume to which digest was diluted, M_s= mass of sample (g) and V_d= volume of digest distilled.

Determination of crude fat content of the sample was done using Soxhle type of the direct solvent extraction method. Crude fat represents total fat in most samples. At the end of the extraction, the solvent was evaporated and the flask dried in the oven (at 60^{0}C). The flask was then cooled and reweighed. The percentage crude fat (Lipid) was calculated using the formula:

$$CL\ (\%) = \frac{M_{ex}}{M_g}\ X\ 100$$

Where:

M_{ex} = Mass of extract (g)
M_s = Mass of sample used (g).

Total carbohydrate content of the sample was estimated by 'differences' [14]. In this, the sum of the percentages of all the other proximate components was subtracted from 100 i.e.
Total CHO (%) = 100 – (% moisture + % crude protein + % crude fat + % ash).

3. Results

The results of the phytochemical and proximate study of *Catharanthus roseus* are shown in the Tables 1, 2 and 3.

Table1: Qualitative phytochemical content of *Catharanthus roseus*

Sample/Constituent	Leaf	Stem
Alkaloid	+	+
Tannin	+	+
Flavonoid	+	+
Saponin	+	+
Glycoside	+	+
Steroid	+	+
Phenol	+	+
Anthocyanin	+	+

+ = Present; - = Absent.

The leaves and stem indicated presence of all the phytochemicals investigated.

Table 2: Quantitative phytochemical content (%) of *C. roseus*

Constituent	Leaves	Stem
Tannin	0.68 ± 0.3	0.44 ± 0.1
Sterol	0.16 ± 0.01	0.05 ± 0.1
Flavonoid	0.48 ± 1.3	0.17 ± 0.4
Glycoside	1.76 ± 0.5	0.82 ± 0.3
Alkaloid	11.84 ± 1.2	7.84 ± 0.2
Saponin	0.46 ± 0.6	0.29 ± 0.3
Phenol	0.32 ± 0.01	0.09 ± 0.1
Anthocyanin	0.42 ± 0.6	0.31 ± 0.7

Alkaloid recorded the highest value (11.84%) in the leaf and (7.84%) in the stem.
The least component was sterol (0.05%) in the stem and (0.16%) in the leaves.

Table 3: Proximate composition of *C. roseus and percentage occurrence*

Sample/Constituent	Leaf	Stem Bark
Protein	4.74 ± 0.3	2.67 ± 0.2
Fat	42.80 ±1.1	54.21 ± 1.2
Fiber	17.55 ± 0.6	19.34 ± 0.1
Ash	8.94 ± 0.6	4.76 ± 0.2
Carbohydrate	40.25 ± 2.5	56.71 ± 1.6

Moisture	15.72 ± 1.1	12.35 ± 1.3
Dry matter	24.28 ± 0.1	27.65 ± 0.01

The component with the highest value was carbohydrate (56.71%) found in
The stem and (40.25%) in the leaves. This was followed by fat with 54.21%
In the stem and the least component was protein (2.67) in the stem.

4. Discussion

The result of the phytochemical study of *Catharanthus roseus* revealed the presence of alkaloid, saponin, flavonoid, sterol, phenol, and anthocyanin in the bark and leaf extracts.

These plant constituents have made remarkable impact in pharmaceutical industries. They serve nutritional and medicinal purpose in man and animal. Alkaloids are often toxic to man and many have dramatic physiological activities, hence their wide use in medicine for the development of drugs [15, 8]. Saponin has been shown to possess beneficial property and to exhibit structure dependent biological activities. They can be used as diver tic, healing agents and analgesics [13]. High concentration of saponin in the leaf, stem and root of *Catharanthus roseus* may have been responsible for its effectiveness in relaxation of the muscles and brain nerves thereby inducing sleep and reducing blood pressure. Flavonoids are anti-allergic, anti-inflammatory [7, 17], anti-microbial and inhibit the initiation, promotion and progression of tumors.

Proximate study revealed the presence of carbohydrate, protein, moisture and fiber. Carbohydrates are the most abundant of the four classes of biomolecules. They play major roles in storage and transport of energy and their derivatives in the working process of the immune system, fertilization, blood clothing and so on [15]. Proteins are very essential constituent of all living organism. They are made up of mainly carbon, hydrogen, oxygen and nitrogen but sometime comprise of sulphur and phosphorus [14, 16, 18]. Reported that fiber have been found to protect against cancer while [4, 19] reported that a diet high in soluble fiber lowers blood level of the harmful type of cholesterol without lowering the good cholesterol level. Hence, the high concentration of crude fiber in the leaf, stem and root of *Catharanthus roseus* increases its potentials as laxatives and in reduction of excessive weight.

This study has helped to expose the essential bioactive compounds in *Catharanthus roseus*, hence presenting the plant as a reservoir for the treatment of many diseases.

5. References

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