

PHYTOCHEMICAL AND PROXIMATE COMPOSITIONS OF AQUEOUS LEAF-EXTRACT OF *CENTROSEMA PUBESCENS*

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Abstract

The aim of this research was to evaluate the phytochemical (phenols, tannins, terpenoids, alkaloids, glycosides and flavonoids) and proximate (carbohydrate, moisture, protein, lipid, ash and fibre) compositions of *Centrosema pubescens* leaves. These were done using well known standard methods. The results of proximate and phytochemical constituents respectively revealed the following order of occurrences: carbohydrate > moisture > protein > lipid > ash > fibre; phenols > tannins > terpenoids > alkaloids > glycosides > flavonoids. The presence of these phytochemical and proximate obtained from this study shows that *Centrosema pubescens* leaves are good source of anti-oxidant phytochemicals and essential proximate and thus, could be used as a nutritional supplement to diet together with management of oxidative stress related disorders.

Introduction

The manufacture and clinical evaluation of herbal remedies and/or their isolates have made it increasingly feasible to transform traditional medicine from an almost invisible trade into modern industrial enterprise capable of making significant contribution to both healthcare delivery and economic growth of developing countries (Iwu, 1993). Today, traditional medical practice has been recognised by the World Health Organisation (WHO) as a building block of primary healthcare (Akerle, 1998), though, it emphasizes the fact that safety should be the overriding criterion in the selection of herbal

remedies for use in healthcare. There is no longer doubt regarding the value and potential of traditional remedies.

Developing therapeutic agents from natural products has renewed the worldwide attention and stimulated new wave of research on the benefits of herbal medicine as an effective alternative therapeutic tool for various illnesses (Zhao *et al.*, 2011). Numerous plants have been tested for their therapeutic potentials and among those locally used is *Centrosema pubescens*.

Centrosema pubescens has a common name *centro* or butterfly pea. It is a legume in the family Fabaceae, subfamily Faboideae and tribe Phaseolae.

Centrosema pubescens is vigorous, trailing, twining and climbing perennial herb with trifoliolate leaves and is fairly drought tolerant (Skerman *et al.*, 1988). It is native to Central and South America and cultivated in other tropical areas as forage for livestock (Skerman *et al.*, 1988). *Centro* is a perennial herb that can reach a height of 45 cm (17.5 in). The root system can reach up to 30 cm in depth, frequently in association with *Rhizobium*, nitrogen-fixing bacteria (Souza *et al.*, 2011). Stems grow and branch rapidly, producing a dense mass of branches and leaves on the soil. Stems do not become woody until about 18 months after planting. Leaves are trifoliolate, with elliptical leaflets approximately 4 cm × 3.5 cm (1.6 in × 1.4 in), dark-green and glabrous above but whitish and densely tomentose below (Skerman *et al.*, 1988). Flowers are generally pale violet with darker violet veins, born in axillary racemes. Fruit is a flat, long, dark brown pod 7.5–15 cm (3.0–5.9 in) long, containing up to 20 seeds. Seeds are spherical, about 4–mm (0.16–inches) in diameter, dark brown when ripe (Nworgu and Egbunike, 2013). This plant is not purposefully planted in Nigeria but grows as weed but used traditionally in the treatment of anaemia related conditions, especially in South East Nigeria (Nworgu and Egbunike, 2013).

Centrosema pubescens is a good source of protein, calcium and potassium for cattle as forage. It can be used to feed broiler chickens and broiler finishers as leaf meal in a quantity up to 20 g per day. More than this amount may cause reduction in growth performance

(Nworgu and Egbunike, 2013). *C. pubescens* leaf meal has been shown to contain dry matter, crude protein, crude fibre, ash, calcium, potassium, phosphorus, magnesium, sodium, zinc, iron, phytate and tannins (Nworgu and Egbunike, 2013). Traditionally, it is used as a source of plant protein in piggery and animal husbandry in the Igbo speaking South east Nigeria (Nworgu and Egbunike, 2013). This may be a very cheap alternative to other sources of protein that are usually more expensive, like Soya bean. Hence, this research was designed to determine the phytochemical (phenols, tannins, terpenoids, alkaloids, glycosides and flavonoids) and proximate (carbohydrate, moisture, protein, lipid, ash and fibre) compositions of *Centrosema pubescens* leaves.

Materials and Methods

Fresh leaves of *Centrosema pubescens* were collected from Afikpo, Ebonyi State and were identified by Prof. S. C. Onyekwelu, a plant Taxonomist in the Department of Applied Biology, Ebonyi State University, Abakaliki, Ebonyi State, Nigeria. They were cleaned of dirt and kept for the analysis.

Proximate Analysis

Proximate analyses were determined according to the methods of Association of Official of Analytical Chemist (AOAC, 2016).

Preparation of Aqueous Leaf Extract of *Centrosema pubescens*

The fresh plant leaves were thoroughly washed with distilled water and dried at room temperature and with the use of laboratory manual blender. They were ground to a coarse form to expose a larger surface area. The ground leaves were soaked in distilled water for 24 hours to allow for adequate leaf extraction. The extract was filtered using a sieve cloth. The resulting extract were concentrated, and allowed to evaporate to dryness using rotary evaporator.

Phytochemical Analysis

Phytochemical analyses were determined according to Harborne (2016).

Statistical Analysis

The results were expressed as mean and standard deviation (SD) and data were subjected to one-way Analysis of Variance (ANOVA). Significance differences were

obtained at $p < 0.05$. The estimation of this analysis was done using Statistical Package for Applied Sciences (SPAS), version 18.

Results

The results of percentage proximate constituent of the leaves of *Centrosema pubescens* showed the presence of lipid, protein, ash, moisture, fibre and carbohydrate. The results revealed the following order of occurrence; carbohydrate > moisture > protein > lipid > ash > fibre as shown in Figure 1. The results of the phytochemical constituents of *Centrosema pubescens* aqueous leaf-extract showed the presence of phenols, tannins, terpenoids, steroids, flavonoids, glycosides, saponins, hydrogen cyanide and alkaloids in the extract sample. The results revealed the following order of occurrence of the phytochemicals of its concentration; phenols > tannins > terpenoids > alkaloids > glycosides > flavonoids as shown in Figure 2.

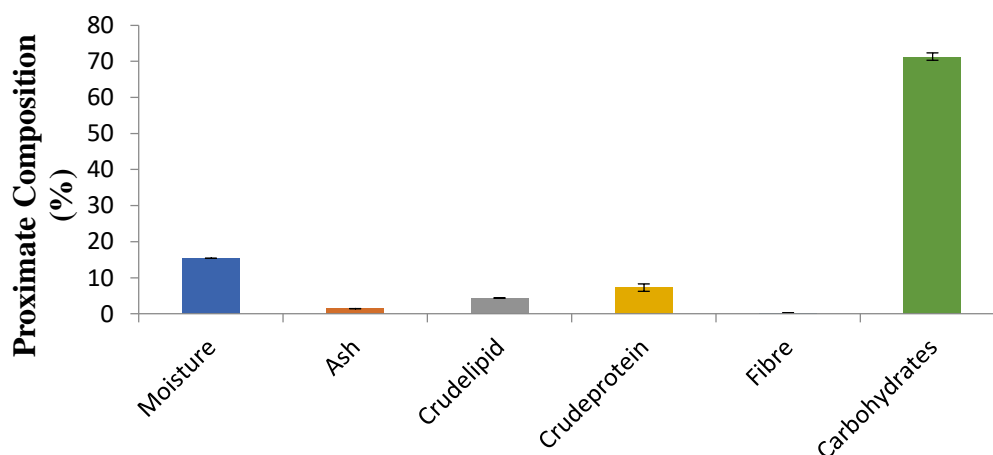


Figure 1: Percentage Proximate Composition of *Centrosema pubescens* dry Leaf Sample.

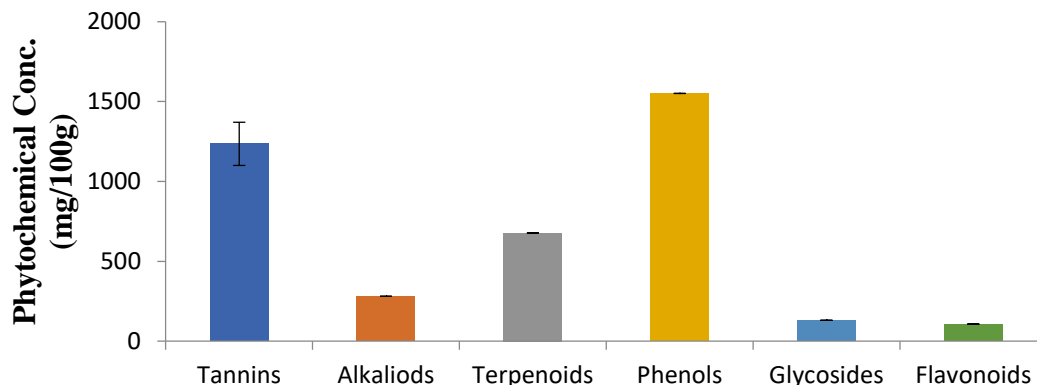


Figure 2: Phytochemical constituent in mg/100g of *Centrosema pubescens* aqueous leaf-extract

Discussion

Proximate constituents of the leaves of *Centrosema pubescens* revealed the presence of fat, protein, ash, moisture, fibre and carbohydrate. The results revealed that carbohydrate was the highest while fibre was the lowest in percentage. The results of this research are in agreement with the earlier findings of (Ojelere, 2014) who also reported similar contents of carbohydrates, proteins, moisture, fibre, fat and ash in some selected medicinal seeds.

Proteins, fats and carbohydrates are essential for life and studies have indicated that life is sustained by nutrient mixtures of foods containing them (Ojelere, 2014). Carbohydrates are known to be important components in many foods, and the digestible carbohydrates are considered as an important source of energy (Ojelere, 2014). The protein value of 20 % falls within the range of findings by Bello *et al.*, (2008). Availability of protein contents is helpful in maintaining proper growth and development in adults,

children, and pregnant women that require good quantity of protein daily (Aletor and Adeogun, 1995). As a nutritive value of food, fibers in the diet are necessary for digestion and for effective elimination of wastes, and can lower the serum cholesterol, the risk of coronary heart disease, hypertension, constipation, diabetes, colon and breast cancer (Ishida *et al.*, 2000). Thus *Centrosema pubescens* can be considered as a valuable source of dietary fiber in human nutrition. Hussain *et al.* (2013) suggested a strong correlation between moisture contents and fiber, which could be of interest to human health as the fibre are easily digested and disintegrated. This research showed that *Centrosema pubescens* can be used as a nutritional supplement to diet.

Phytochemical constituents of *Centrosema pubescens* aqueous leaf-extract showed the presence of phenols, tannins, terpenoids, steroids, flavonoids, glycosides, saponins, hydrogen cyanide and alkaloids in the extract sample. The results revealed that phenol was the highest while hydrogen cyanide was the lowest in concentration. This correlates with

the report of Lawal *et al.* (2012) who reported presence of some phytochemical constituents on some medicinal plants, though with a variations in the concentration. The phytochemical screening of the aerial part of *Morinda lucida* revealed that it contains alkaloids, saponins, tannins, flavonoids, terpenoids and steroids (Kikakedimau *et al.*, 2012). Phytochemical composition of plants is greatly influenced by different agro-climatic conditions. Previous studies state that phytochemical composition of plants is influenced by a variety of environmental factors including the geography, climate, soil type, sun exposure, grazing stress and seasonal changes (Kumar *et al.*, 2017).

These compounds have been shown to be active against potentially significant pathogens including those that are responsible for enteric infections (Kumar *et al.*, 2017). Apart from their potential antibacterial activity, compounds present in this study such as alkaloids are known as antimalarial agents, analgesics and can act as stimulants. The presence of flavonoids as shown in this study suggests that this plant may be good for the management of cardiovascular diseases and oxidative stress, since flavonoids are biologic antioxidants. Several studies have shown that certain flavonoids can protect LDL from being oxidized (Kumar *et al.*, 2017). The valuable pharmaceutical properties in this plant may be attributed to the presence of bioactive compound like alkaloid and flavonoid (Kumar *et al.*, 2017). The presence of these

phytochemicals may be responsible for the medicinal property of this plant extract.

Conclusion

The results of proximate constituent of the leaves of *Centrosema pubescens* revealed the presence of fat, protein, ash, moisture, fibre and carbohydrate. This showed that this plant can be used as a nutritional supplement to diet. The results of the phytochemical constituents of *Centrosema pubescens* aqueous leaf-extract showed the presence of phenols, tannins, terpenoids, steroids, flavonoids, glycosides, saponins, hydrogen cyanide and alkaloids in the extract sample. The presence of these phytochemicals may be responsible for the medicinal property of this plant extract.

Recommendations

The *Centrosema pubescens* leaves were found to contain some degree of medicinal properties required for adequate diet and it is therefore recommended that:

- The *Centrosema pubescens* should be incorporated into our daily diet.
- It should be recommended to people with some health disorders like cardiovascular diseases, such as stroke and atherosclerosis and so on, so as to reduce risk factor.
- Further studies should be carried out to isolate, characterize and elucidate the structures of the bioactive compounds present in the *Centrosema pubescens* leaves.

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