



**PHYTOCHEMICAL SCREENING AND PROXIMATE ANALYSIS OF ROOT OF  
*CURCUMA LONGA* LINN.**

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Article Received on 05/07/2019

Article Revised on 26/07/2019

Article Accepted on 16/08/2019

**ABSTRACT**

Study on the evaluation of nutritional quality as well as phytochemical screening of poorly utilized plant products is of immense importance. This research work was aimed at screening the phytochemicals in different solvent (Aqueous, Methanol and n-hexane) extracts as well as proximate analysis of root of *Curcuma longa* Linn using standard methods. The results revealed the presence of Alkaloids, Flavonoids, Cardiac glycosides, Saponins and Tannins in all the three extracts, with methanol extract possessing the highest percentage of the phytochemicals followed by the aqueous extract and finally n-hexane extract. In addition to the above, the presence of balsams, terpenes and steroids, phenol and resins was detected in methanol extract while aqueous extract have resins, terpenes and steroids. Proximate analysis of the root of *Curcuma longa* Linn showed high carbohydrates content with low moisture, ash, crude protein, crude fiber and fat content.

**KEYWORDS:** Phytochemicals screening, proximate analysis, *Curcuma longa* Linn, and Root.

**INTRODUCTION**

The plant Turmeric (*Curcuma longa*), also known as Gangamau in Hausa language is a rhizomatous herbaceous perennial plant of the ginger family (Zingiberaceae), Zingiberaceae grows 5 - 6 feet high in the tropical regions of Southern Asia, with trumpet-shaped, dull yellow flowers. Its roots are bulbs that also produce rhizomes, which then produce stems and roots for new plants. Turmeric has a bitter and somewhat sharp taste; individual plants are about 1m tall with long oblong leaves when exposed to temperatures between 20 °C and 30 °C (68 °F and 86 °F) and a considerable amount of annual rainfall. Plants are gathered annually for their rhizomes, and are reseeded from some of those rhizomes in the following season.<sup>[1]</sup> The rhizome from which the turmeric is derived, is tuberous, with a rough and segmented skin which mature beneath the foliage in the ground, they are yellowish brown with a dull orange interior. The main rhizome is pointed or tapered at the distal end and measures 2.5–7.0 cm (1–3 inches) in length and 2.5 cm (1 inch) in diameter, with smaller tubers branching off. When the turmeric rhizome is dried, it can be ground to a yellow powder with a bitter, slightly acrid, yet sweet, taste.<sup>[2]</sup> The known active

compounds in Turmeric include curcuminoids, a family of curcumin and related compounds and the volatile oil fraction, characterized by turmerones. Research is focusing on the whole herb and its extracts which are expected to be more effective than isolated curcumin.<sup>[1]</sup>

Studies suggest Turmeric originated in Southern India which continues to be the world's largest producer. As a seedless plant, its movement to new locations throughout the tropics has been dependent upon people.<sup>[3]</sup> By 800 AD Turmeric had spread across much of Asia, including China, and across Africa. By the 18th century Turmeric made its way to Jamaica and it is now cultivated throughout the tropics, including Hawaii and Costa Rica. In the ancient times, Ayurvedic medicine used Turmeric for the digestive, circulatory and respiratory systems. It was used in treating indigestion, cough, arthritis, diabetes and purifying blood. Similarly, Chinese medicine uses Turmeric for the treatment of epigastric and abdominal pain, various menstrual irregularities, swellings and trauma.<sup>[3]</sup>

This study could go a long way in providing the phytochemical and proximate content of *Curcuma longa*

root obtained in Bauchi state, Nigeria. Thus, providing a scientific basis for the medicinal and nutritional use of the plant.

## MATERIALS AND METHODS

### Sample collection and preparation

The root of *Curcuma longa* Linn was collected from Toro Local Government Area of Bauchi State, Nigeria. It was identified and authenticated by a taxonomist from the Department of Plant Biology, Faculty of Sciences, Bayero University Kano and was given a voucher number of (BUK/HAN/0188). The root was air dried under a shade at room temperature.

### Phytochemical screening of *Curcuma longa* root

Phytochemical tests were carried out by using the standard methods of,<sup>[4]</sup>,<sup>[5]</sup>,<sup>[6]</sup>,<sup>[7]</sup>,<sup>[8]</sup> and,<sup>[9]</sup>

### Analysis of proximate contents of *Curcuma longa* root

Ten gram (10g) of the flour was soaked in 100 ml of pre-boiled distilled water. The solution was shook vigorously

and allowed to stand for 24 hours. It was then filtered using Whatman's No. 1 filter paper and concentrated by freeze-drying to solvent free extract. The proximate analysis of the seed extract for moisture, ash, fibre carbohydrate, crude protein and fat contents were determined as described by AOAC standard assay method.<sup>[10]</sup>

## RESULTS

The results of the qualitative and quantitative phytochemical screening of aqueous, Methanol and n-hexane root extracts of *Curcuma longa* Linn are shown in Table 1 below. The results indicated the presences of Alkaloids, Flavonoids, Cardiac glycosides, Saponins, Tannins and Carbohydrates in all the solvent extracts with methanol extract having the highest percentage of the phytochemicals than aqueous and n-hexane. In addition to the above methanol extract also have indicated the presences of Balsams, Terpenes and Steroids, Phenol and Resins while aqueous extract have Resins, Terpenes and Steroids.

**Table 1: Qualitative and Quantitative Phytochemical content of *Curcuma longa* Linn Aqueous, Methanol and n-Hexane Root Extracts.**

Constituents	Aqueous Content (%)	Methanol Content (%)	N-Hexane Content (%)
Alkaloids	+ 0.310±0.020 <sup>a</sup>	+ 7.972±0.124 <sup>b</sup>	+ 0.226±0.261 <sup>a</sup>
Saponins	+ 5.342±0.342 <sup>a</sup>	+ 8.742±0.492 <sup>b</sup>	+ 2.348±0.344 <sup>b</sup>
Tannins	+ 4.020±0.611 <sup>a</sup>	+ 9.840±0.786 <sup>b</sup>	+ 2.640±1.084 <sup>a</sup>
Flavonoids	+ 1.228±0.388 <sup>a</sup>	+ 5.336±0.523 <sup>b</sup>	+ 3.867±0.441 <sup>b</sup>
Cardiac glycosides	+ 8.664±0.977 <sup>a</sup>	+ 11.906±0.883 <sup>a</sup>	+ 10.565±1.546 <sup>a</sup>
Carbohydrates	+ 7.560±0.891 <sup>a</sup>	+ 13.764±1.042 <sup>b</sup>	+ 6.923±0.982 <sup>a</sup>
Balsams	- ND	+ 1.021±0.127	- ND
Terpene and steroids	+ 1.640±0.456 <sup>a</sup>	+ 7.340±0.781 <sup>b</sup>	- ND
Phenols	- ND	+ 1.220±0.820	- ND
Resins	+ 0.870±0.081 <sup>a</sup>	+ 0.840±0.094 <sup>a</sup>	- ND

Same superscripts indicate no significant difference ( $p>0.05$ ) across rows.

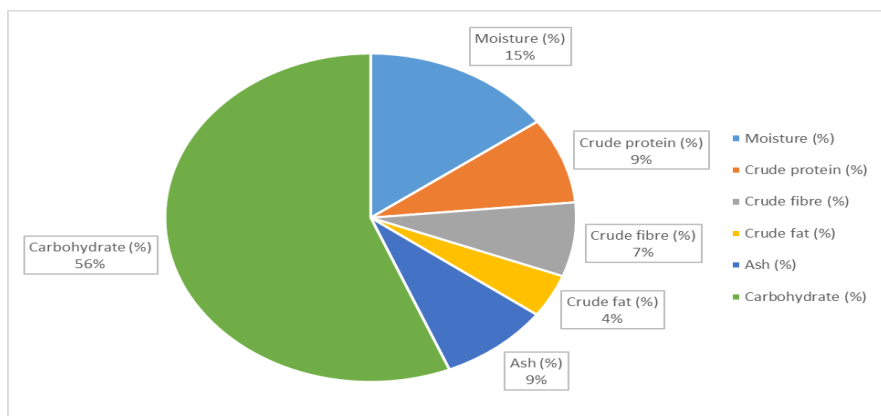
Key:

+ Present

- Absent

ND = Not detected

The result of proximate composition of *Curcuma longa* Linn root powder in mg/100g of dry sample is shown in Figure 1. It shows that root of *Curcuma longa* Linn has high percentage of carbohydrate and low percentage of crude fat.



**Figure 1: Results of Proximate Composition of *Curcuma longa* Linn (in mg/100g of dry sample).**

## DISCUSSION

Plant produced different chemical compounds or phytochemical which have been used in a wide range of commercial, Medicinal and industrial applications. The result obtained from the preliminary qualitative phytochemical screening of different solvent extracts of *Curcuma longa* Linn root showed similar results in a studies conducted in Ilorin and Kano which found cardiac glycosides, flavanoids, saponins, tannins and alkaloids from plants.<sup>[11,12]</sup> The studies also described the phytochemicals in medicinal plants as the active principles responsible for the pharmacological potentials of medicinal plants and reduction in the effect of diabetic complication<sup>[11]</sup>. Studies have also shown that tannins and alkaloids also have some pharmacological effects and are used as hypoglycemic, anti-diuretic and anti-diarrhea drugs. They are also used as local anesthetics, analgesics and antimalarial drugs.<sup>[12]</sup> They are often non-toxic and have dramatic physiological activities hence they are widely used in medicine.<sup>[13]</sup> Lower dose of alkaloids mediate important pharmacological activities, such as analgesic, reducing blood pressure, killing tumour cells, stimulating circulation and respiration.<sup>[14]</sup>

Tannins have the ability to precipitate certain proteins. They combine with digestive enzymes thereby making them unavailable for digestion.<sup>[15]</sup> Although, secondary plant metabolites known as phytochemicals are known to be important to both plants and animals but could also be harmful or show some adverse effects to animals especially when consumed in large quantities hence called anti-nutrients.<sup>[16]</sup> Anti-nutritional factors are known to affect the availability of nutrients required by the body and interfere with metabolic process so that growth and development of the body is negatively influenced. These anti-nutritional factors can easily be reduced to tolerable limits by proper processing techniques such as soaking, cooking and frying.<sup>[14]</sup>

The quantitative analysis on the other hand showed methanol extract having a higher percentage of the secondary metabolites than the aqueous extract and n-hexane extract. Cardiac glycosides were the highest percentage found in the Methanol extract, however, this is different from similar studies which showed Flavonoids and saponins as the highest proportion of phytochemicals.<sup>[17,18]</sup>

The variation observed may be due to the difference in plants under study.

From Percentage proximate analysis of *Curcuma longa* Linn, which shows it contains 15.0% of moisture content, which indicates that the plants have a long shelf life and are quite succulent. The plants possess 8.70% ash content, the pH level of our internal fluids affects every living cell in our bodies. The effect that over-acidification can have upon overall health is immense. A chronically over acidic pH creates an extremely negative environment that then affects all cellular functions from

the beatings of the heart to the neural workings of the brain. Overall health depends on an alkaline environment, created by eating foods with high ash content.<sup>[19]</sup> Crude fat of 4.25% was present, the crude fat contents of *Curcuma longa* Linn may contribute greatly to the energy value of food and also slow down the utilization of carbohydrates and helps in lubricating the intestine.<sup>[20]</sup> *Curcuma longa* Linn showed 7.30% of crude fibre. Dietary fiber means the edible parts of plants or analogous carbohydrates that are resistant to digestion and absorption in the human small intestine with complete or partial fermentation in the large intestine.<sup>[21]</sup> The fibre (7.30%) presents in turmeric will help to cleanse the digestive tract of its consumer by removing potential carcinogens from the body and prevents the absorption of excess cholesterol, and also adds bulk to the food and prevents the intake of excess starchy food and may therefore guard against metabolic conditions such as hypercholesterdemia and diabetes mellitus.<sup>[22]</sup> So also, certain physiological responses have been associated with the consumption of dietary fibre such as increase in faecal bulk, lowering of plasma cholesterol, a blunting of the post-anal increase in plasma glucose and a lowering of nutrients bioavailability.<sup>[23]</sup>

## CONCLUSION

The study revealed that *Curcuma longa* Linn root is rich in phytochemicals that may be responsible for some of its reported pharmacological activities. It also shows that the root is of high nutritional value.

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