

# Phytochemical screening and proximate nutritional analysis of brown leaves of Indian almond (*TerminaliacatappaL.*)

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**Abstract-** The phytochemical and proximate nutritional analyses of brown leaves of *Terminaliacatappa L.* were determined using the methods of Association of Official Analytical Chemists and expressed in mean standard deviation. The phytochemical concentrations (mg/100g) of the aqueous, ethanol and methanol extract revealed the presence of tannins (0.50±0.58, 0.49±0.58, 0.47±0.56), saponins (2.67±1.33, 2.99±1.41, 3.31±1.49), alkaloids (1.20±0.89, 1.32±0.89, 1.23±0.90), phenols (0.32±0.49, 0.45±0.55, 0.35±0.48), flavonoids (0.93±0.79, 0.86±0.76, 0.65±0.66), anthraquinones (0.02±0.05, 0.03±0.06, 0.04±0.65) and glycosides (-, 6.12±2.02, 2.10±1.18) respectively. The result revealed that the leaves were very high in glycosides, saponins and alkaloids but low in tannins, phenols, flavonoids and anthraquinones. The proximate nutritional analysis revealed crude protein 4.2±1.67, fibre content 12.9±2.94, fat content 4.6±1.75, ash content 12.1±2.84, moisture content 8.3±2.35, and carbohydrate content 57.9±6.21. Carbohydrates had the highest concentration followed by fibre, ash and moisture content, while proteins and fats had low concentration. This study justifies the use of *TerminaliacatappaL.* leaves by traditional practitioners to treat various ailments and by pharmaceutical companies to produce useful drugs. The leaves are rich source of carbohydrates, fats and proteins.

**Index Terms-** Terminaliancatappa, phytochemical analysis, nutritional analysis, brown leaves

## I. INTRODUCTION

The therapeutic and medicinal properties of plants have been in existence for thousands of years. However the use of plants to cure diseases and relieve physical suffering dates back to the ancient times of man's history. The use of plants as medicine by traditional people laid basis for the evolution of modern medicine. Herbal therapy has come of age and today medicinal plants play a significant role in human health care globally. Plant natural product chemistry has played an active role in generating significant candidate compounds in drug discovery programs. Nutrition is the science of food, the nutrients and other substances there in, their action, interaction and balance as related to health and diseases. Nutrients are grouped into six (6) classes namely carbohydrates, fats (lipids), proteins, vitamins, mineral and water. The general functions of these nutrients include fuel (energy) expressed in kilocalories,

building materials for body structures, regulation and control of body processes.

*Terminaliacatappais* used by locals to treat a wide range of ailments (malaria, pains, headache, sickle cell disease, cough, asthma, sexual dysfunction and rheumatic joints) and also food for farm animals. So, this study becomes pertinent as to reveal and evaluate the phytochemicals present in the brown leaves of *Terminalia* and show how rich in nutrients this plant is. This research will serve as an avenue for developing new drugs as a result of phytochemicals present in them and also as a source of food for animals. In this work we determine the qualitative and quantitative phytochemical content of brown leaves of *Terminaliacatappa* using ethanol and methanol and aqueous extracts. The paper is organized as follows: Section 1 has the introduction, the Materials and method are discussed section 2. In section 3, we presents our findings. Finally, we give a brief discussion in section 4 before the conclusion in section 5 and then the references also given.

## Experimental

### Sample Collection

The brown leaves of *Terminaliacatappa* were collected from University of Calabar, Calabar.

### Preparation of Plant Material

Fully matured brown leaves of *Terminaliacatappa* were collected and washed with running tap water followed by sterile distilled water. Plant sample was air dried at room temperature in a clean environment to avoid contamination and then ground into powder using domestic grinder. Powdered sample was stored in air tight glass bottle at room temperature for use.

### Preparation of Plant Extract

50g of sample (powdered brown leaves of *Terminaliacatappa*) was measured into a thimble. A water condenser was attached to the Soxhlet extractor, connected to the neck of a 500ml flask containing the solvent, 300ml of water held over the hot plate. Vapour produced from the heating solvent reaches Soxhlet extractor through the side tubers and condensed by passing through the condenser. The solvent now condensed and dropped on the powdered sample in the thimble, dissolving the required substance; the solution was filtered through the downward tubes into the flasks holding the solvent. This process continued until the solvent passing through the thimble became colourless. At this point the extraction was complete. The extract was distilled off and evaporated to obtain solid sample for the phytochemical test (AOAC, 2000).

**Phytochemical Screening**

Standard procedures were employed to test for the presence of phytochemicals such as tannins, saponins, alkaloids, glycosides, phenols, flavonoids and anthraquinones in the brown leaves of *Terminaliacatappa* (Trease and Evans, 1989).

**Proximate Analysis**

The proximate analysis of powdered plant material of brown leaves of *Terminaliacatappa* was carried out using the AOAC (Association of Official Analytical Chemist, 1995, 2000) methods in the Department of Chemical Sciences, Cross River State University of Technology (CRUTECH). The sample was

analyzed for moisture, crude protein, crude fat, ash content, fibre content and carbohydrate.

II. RESULT

**Qualitative Analysis of *Terminaliacatappa L.* using AOAC**

The result of the qualitative analysis of *Terminaliacatappa L.* in **Table 1** revealed the presence of alkaloids, saponins, tannins, phenols, flavonoids, glycosides and anthraquinones in different concentrations.

**Table 1: Shows the qualitative analysis of *TerminaliacatappaL.***

	Chemical Constituent	Aqueous Extract	Ethanol Extract	Methanol Extract
1	T a n n i n s	+	+	+
2	S a p o n i n s	( + + + )	( + + + )	( + + + + )
3	A l k a l o i d s	+	+ + +	+ + +
4	G l y c o s i d e s	-	+ + + +	+ + + +
5	P h e n o l s	+	+	+
6	F l a v o n o i d s	+	+	+
7	A n t h r a q u i n o n e s	+	+	+

**Keys**

(+) = Present; (++) = moderately present; (+++) = highly present; (++++) = excessively present; (-) = absent

**Quantitative analysis of *Terminaliacatappa L.* using AOAC**

The result from the quantitative analysis of green leaves of *Terminaliacatappa* in **Table 2** revealed the presence of alkaloids,

saponins, tannins, phenols, flavonoids, glycosides and anthraquinones in different concentrations as calculated using mean and standard deviation.

**Table 2: Shows the quantitative analysis Mg/100g of *TerminaliacatappaL.***

S / N	Chemical Constituent	Aqueous Extract	Ethanol Extract	Methanol Extract
1	T a n n i n s	0 . 5 0 ± 0 . 5 8	0 . 4 9 ± 0 . 5 7	0 . 4 7 ± 0 . 5 6
2	S a p o n i n s	2 . 6 7 ± 1 . 3 3	2 . 9 9 ± 1 . 4 1	3 . 3 1 ± 1 . 4 9
3	A l k a l o i d s	1 . 2 0 ± 0 . 8 9	1 . 3 2 ± 0 . 8 9	1 . 2 3 ± 0 . 9 0
4	G l y c o s i d e s	-	6 . 1 2 ± 2 . 0 2	2 . 1 0 ± 1 . 1 8
5	P h e n o l s	0 . 3 2 ± 0 . 4 6	0 . 4 5 ± 0 . 5 5	0 . 3 5 ± 0 . 4 8
6	F l a v o n o i d s	0 . 9 3 ± 0 . 7 9	0 . 8 6 ± 0 . 7 6	0 . 6 5 ± 0 . 6 6
7	A n t h r a q u i n o n e s	0 . 0 2 ± 0 . 0 5	0 . 0 3 ± 0 . 0 6	0 . 0 4 ± 0 . 6 5

**1.1. Proximate analysis of green leaves of *Terminaliacatappa L.***

The result from the proximate analysis of the green leaves of *T. catappa* in **Table 3** revealed that the leaves contained moisture, ash, crude fat crude fibre, crude protein and carbohydrate in their different concentrations as calculated using mean and standard deviation.

**Table 3: Shows the proximate composition of brown leaves of *TerminaliacatappaL.***

S / N u m b e r	N u t r i e n t	C o m p o s i t i o n
1	P r o t e i n s	4 . 2 ± 1 . 6 7
2	F i b r e	1 2 . 9 ± 2 . 9 4
3	F a t	4 . 6 ± 1 . 7 5
4	A s h	1 2 . 1 ± 2 . 8 4
5	M o i s t u r e	8 . 3 ± 2 . 3 5
6	C a r b o h y d r a t e	5 7 . 9 ± 6 . 2 1

### III. DISCUSSION

In this study, the findings on the phytochemical screening of aqueous, ethanolic, methanolic extracts, and proximate nutritional analysis of plant sample revealed the presences of tannins, saponins, alkaloids, glycosides, phenols, flavonoids, and anthraquinones as shown in **Table 1**. Saponins (2.67±1.33, 2.99±1.41, 3.31±1.49) and alkaloids (1.20±0.89, 1.32±0.89, and 1.23±0.90) were highly present in aqueous, ethanolic, and methanolic extract respectively. Glycosides were highly present in ethanolic (6.12±2.02) and methanolic (2.10±1.18) extracts but absent in aqueous extract of sample while tannins (0.50±0.58, 0.49±0.58, 0.47±0.56), phenols (0.32±0.49, 0.45±0.55, 0.35±0.48), flavonoids (0.93±0.79, 0.86±0.76, 0.65±0.66) and anthraquinones (0.02±0.05, 0.03±0.06, 0.04±0.65) were found in low quantity as shown in **Table 2**. The phytochemical screening of brown leaves of *Terminaliacatappa* agree with the findings of other researchers. (Yakubuet *al.*, 2005)., reported that the presence of saponins, phenols and glycosides may be responsible for the acclaimed anti-anaemic potential of plants used in traditional medicine. Singh *et al.*, (1991) explained that the saponins are known to enhance natural resistance and recuperate body power. (Babayi, *et al.*, 2004) reported that the occurrence of tannins shows that the plant may be useful in food and pharmaceutical industries.

The proximate analysis of brown leaves of *Terminaliacatappa* revealed the presence of nutrients namely: protein 4.2±1.67, Fibre 12.9±2.94, fat 4.6±1.75, Ash 12.1±2.84, moisture 8.3±2.35, with high carbohydrate 57.9±6.21. This values above shows that the brown leaves of *Terminaliacatappa* will make a good food for farm animals as it is rich in carbohydrate. This study is similar to the work done by (Vijaya *et al.*, 2012) on the evaluation of proximate composition and phytochemical analysis of *Terminaliacatappa* from Nagapattinam region of India

### IV. CONCLUSION

The brown leaves of *Terminaliacatappa* contain phytochemicals (saponins, tannins, alkaloids, flavonoids, phenols, glycosides and anthraquinones) that are potential sources for useful drugs. This study may be considered for further feeding and testing in experimenting animals for disease conditions to justify the use of leaves of *TerminaliacatappaL.*

treating various ailments by traditional practitioners. The awareness created by this study can be used for further development of phytomedicines and remedies that can improve health status of humans.

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