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PHYTOCHEMICAL AND PROXIMATE ANALYSIS OF BITTER GOURD (*M. charantia*) LEAF

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Abstract: *This research investigates the phytochemical and proximate compositions of bitter gourd (M. Charantia) leaf sample to achieve, standard protocols for sample collection, preparation and analysis were adopted. In the result of phytochemical screening of M. Charantia the presence of bioactive metabolites such as cardiac-glycosides, terpenoids, flavonoids, tannins and Alkaloids were detected. The presence of these bioactive constituents in this plant is a hint that the plant could be a potential candidate for pharmaceutical research. This is justified by the fact that most of these bioactive metabolites found in M. Charantia leaf have been known to be used in preparation of many drugs. Similarly, the proximate compositions of the sample analyzed were dry matter(96.30.%), moisture content(3.70%), crude proteins(15.03%), crude fibre(25.42%), crude fat(1.40%), ash content(6.14%) and carbohydrates (48.31%) respectively. Protein contents was found to be (15.03%) hence, M. Charantia could serve as an alternative source of proteins, high protein foods are outstanding addition to vegetarian.*

Keywords*: Bitter Gourd, Charantia, Proximate, Flavonoids.*

Introduction

The medicinal plants are useful for healing as well as for curing of human diseases because of the presence of phytochemical constituents (Nostro *et al.,* 2000). Phytochemicals are naturally occurring in the medicinal plants, leaves, vegetables and roots that have defense mechanism and protect from various diseases. Phytochemicals are primary and secondary compounds. Chlorophyll, proteins and common sugars are included in primary constituents and secondary compounds have terpenoid, alkaloids and phenolic compounds (Krishnaiah *et al.,* 2007). Terpenoids exhibit various important pharmacological activities i.e., anti-inflammatory, anticancer, anti-malarial, inhibition of cholesterol synthesis, anti-viral and anti-bacterial activities (Mahato & Sen, 1997). Terpenoids are very important in attracting useful mites and consume the herbivorous insects (Kappers *et al*., 2005). Alkaloids are used as anaesthetic agents and are found in medicinal plants (Hérouart *et al.*, 1988). The *Momordica charantia* belongs to the Cucurbitaceae family and it has common names such as bitter melon, karela and bitter gourd. More than thousand herbal products of *Momordica charantia* are used for treatment of diabetic patients and also helpful in lowering of glucose level in the blood (Marles & Farnsworth, 1995).

The significance of plants as sources of medicinal drugs, vegetables, and food cannot be overstated. According to Akinmoladun *et al.* (2007), the therapeutic value of plants lies in their bioactive phytochemical constituents, which exert specific physiological effects on the human

body. These bioactive substances, found in various plant parts, include saponins, tannins, flavonoids, and alkaloids.

Momordica charantia (M. charantia) is a notable example, with remarkable health benefits. Its continuous consumption has been reported to substitute for insulin in the body, thanks to its steroid content, charantin, which effectively regulates blood sugar levels (Akinmoladun *et al.,* 2007). Furthermore, extracts of M. charantia have been found to inhibit cancer and tumor growth (Cunnick *et al.,* 1990).

Nowadays there have been an increase in the use of *M. charantia* in herbal concoction as well as soup preparation particularly by the people of Borno state but studies on phytochemical and proximate analysis is scanty hence, this research on phytochemical and proximate analysis of *M. charantia* will add value to the existing scientific literature.The aim of this research is to carryout phytochemical and proximate analysis of *M. charantia* samples.This research work revealed phytochemical and proximate compositions of *M. charantia* leaf which inturned sarves as a pivotal mechanism for propelling national development through discoery of plant base nutrients and active pharmaceutical ingredients for use by food and pharmaceutical industries.

Materials and Methods

Sample Collection, Identification and preparation

Materials and reagents such as vaccum oven, crucible, weighing balance, heating mantle, muffle furnance, desicator, concentrated sulphuric acid, sodium hydroxide solution, kjeldahl tablets were used among others. *M. charantia* sample was purchased at Baga road market, Maiduguri, Borno state, Nigeria and identified by a plant Taxonomist. It was pulverized into fine powder and subjected to further analysis in the research laboratory, Chemistry Department, University of Maiduguri.

Phytochemical Screening

The Phytochemical analysis of (*M. Charantia*) bitter gourd leaf sample was conducted using the methods described by Markham (1987), Brain and Turner, (1975), Trease and Evans, (2002), Silver *et.al.*, (1998) &Vishnoi, (1979) respectively.

Proximate Content Analysis

The samples were analyzed for dry matter, moisture, ash, fat, crude protein, crude fibre and carbohydrates according to A.O.A.C method (1990) 15th edition.

DETERMINATION OF MOISTURE CONTENT

The dry matter content of the sample was determined by weighing 5g of sample into petri dish while placed in hot oven at 105^{o}C for 5 hours. Then removed and placed it in dissicator to cool, after cooling it was reweighed. The moisture content was calculated using the formula:-

$$\frac{w3-w1}{w2-w1} \times 100$$

Where:

W_1 : Weight in grammes of empty petri dish

W_2 :Weight of petri dish with sample in grammes before oven dried

W_3: Weight of petri dish with sample in grammes after oven dried

Crude Protein

Crude protein content was analysed using Keljedal tablets and 2 g of sample was weighed into a digestion tube and 2 Keldedahl tablets were added, 10 ml of concentrated sulphuric acid (Conc. H_2SO_4) was added onto the tube and digested at 420 ^oC for 3 hours. After cooling, 80ml of distilled water was added into digested solution. About 50ml of 40% caustic soda (NaOH) was added onto 50 ml of digested and diluted solution and then placed on heating section of the distillation chamber, 30mls of 4% boric acid, bromocresol green and methyl red as an indicator were put onto conical flask and placed underneath the distillation chamber for collection of ammonia, the solution changed from orange to green colour. About 0.1 normal solution of hydrochloric acid (HCl) was weighed into burette. It was titrated until the colour changes from green to pink. The burette reading was taken. The crude protein was calculated using the formula:-

$$\%CP = \frac{(\mathrm{A} - \mathrm{B}) \times \mathrm{N} \times \mathrm{F} \times 6.25 \times 100}{\text{mg of Samples}}$$

Where:-

A:- mls of acid used for titrating the sample

B:-ml of acid used for titrating blank sample (0)

N:-Normallity of acid used for titration

F:-Factor =14.007

6.25:-is constant

100:-conversion to percentage

Crude Fibre

Crude fibre was determined by weighing 2g of samples, it was placed in a flat bottom flask and 50ml of tri-chloroacetic acid reagent (T.C.A) was added the mixture was boiled and refluxed for 40minutes. The flask was removed and cooled to room temperature. Filter paper was used to filter the residue. The residue obtained was washed 4 times with hot water and once with petroleum ether then the filter paper and the sample were folded together and dried at 60^oC in an oven for 24 hours. It was reweighed and then ashed at 650^oC and then cooled and reweighed again. Crude fibre was determined using the formula:-

$$\%CF = \frac{Differenceinweight}{WeightofsampleonDmbas} \times 100$$

Ether Extract (FAT)

The ether extract was determined by using soxhlet apparatus, 2g of the feed sample was weighed into a thimble and 200ml of petroleum ether was measured with measuring cylinder, the solution was put into round or flat bottom flask and was heated at 45^{o}C for 2hours. The collecting flask was removed, and cooled into dessicator for 15minutes and percentage fat sample was determined using the formula:-

$$\%Fat = \frac{Weightoffat}{Weightofsa} \times 100$$

Ash

Ash was determined 2g of sample was weighed into crucible and dried at 105^{o}C for 24hours, then cooled in the dessicator for 15minutes and re-weighed, it was then charred at 650^{o}C in muffle furnace for 2 hours. Then cooled in desicator for 15minutes and re-weighed. It was determined using the formula:-

$$\%ASH = \frac{Lossinweight}{Initialweight} \times 100$$

Carbohydrate

Percentage carbohydrate was determined by computing indirectly by difference using the formular:-

$$\%Carbohydrate = 100 - (\%MC + \%ASH + \%CP + \%CF)$$

Table 1: The result of phytochemical screening of Methanol extract of *Momordica charantia* leaf (Bitter gourd)

S/No	Test	Observation	Result
1i	Test for Anthraquinones	No Reactionn was observed	-
ii	Test for Combined Anthraquinones	No Reaction was observed	-
2	**Test for Cardiac-glycosides**		
i	Salkowski's Test	Reddish brown colouration was observed at the interface	+
ii	Keller-killns Test	A purple ring colour is observed at the interface	+
3	**Test for Terpenoids**	A violet colour was observed	+
4	Test for Flavonoids		
i	Shinoda's test	Red to purple colouration was observed	+
ii	Ferric Chloride test	Blue black precipitate was observed	+
iii	Lead acetate test		-
iv	Sodium hydroxide test		+
5	**Test for Saponins**		
i	Fronthing test	Frothing persist on warming was observed	+
6	**Test for Phlobatannins**		-
7	**Test for tannins**		
i	Ferric Chloride Test	Blue black precipitate was observed	+
ii	Lead acetate test	No colour Reaction was observed	-
8	**Test for Alkaloids**		
i	Drangendroff's reagent	Orange red precipitate was observed	+
ii	Mayer's reagent	No colour Reaction was observed	-

Key: (+) = Detected ; (-) = Not detected

Table 2: The result of percentage proximate Cmposition of *M. charantia* leaf (Bitter gourd)

S/NO	Proximate	Percentage (%)
1	Dry Matter	96.30
2	Moisture Content	3.70
3	Crude proteins	15.03
4	Crude fibre	25.42
5	fat Content	1.40
6	Ash Content	6.14
7	Carbohydrates	48.31

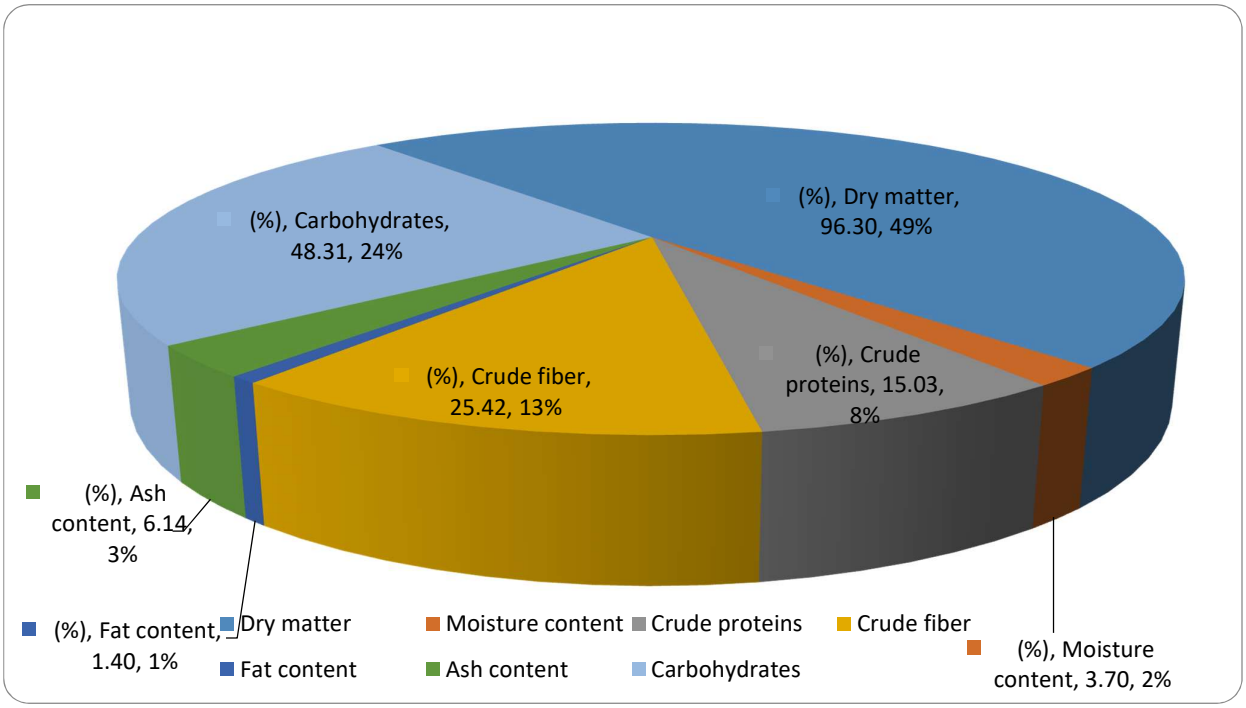

Fig. 1: Proximate analysis of *M. charantia* (Bitter gourd) samples

DISCUSSION OF PHYTOCHEMICAL

The result of phytochemical screening of *M. Charantia* leaf extract revealed that the plant contain many bioactive metabolites of medicinal important. Metabolites such as cardiac-glycosides, terpenoids, flavonoids, saponins, tannins and Alkaloids were detected. However, anthraquinones, and phlobatannins were not detected in the *M. charantia* leaf extract amongst the metabolites, terpenoids have been reported as potent drugs use in the treatment of wide range of ailments (Evans, 2002). *M. charantia* extracts was reported to inhibit cancer and tumour (Cunnick *et al.*,1990). Inhibition of cancer and tumour by *M. charantia* extract is

probably due to the presence of flavonoids in the leaf extract.The presence of these chemical constituents in this plant is an indication that the plant, if properly screened, could yield drugs of pharmaceutical significance. This is better supported by the fact that members of the family of this plant have been known to be involved in ethnomedicine in the management of various ailments (Caceres *et al.*, 1991; Ezeamuzie *et al.*, 1996; Aliyu, 2006). Tannins adversely affect protein digestibility but its minimum level required to elicit a negative growth response has not been fully established, hence it is still unclear as to what of it could be harmful (Elemo *et al*., 2001).

The result of proximate analysis of *M. Charantia* revealed that this plant contain appreciable percentage of proximate contents analyzed amongst which dry matter (96.30%), moisture content (3.70%), crude protein (15.03%), fat content (1.40%), Crude Fiber (25.42%), ash content (6.14%), and as well as carbohydrate (48.31%) respectively. Moreover, the protein content was found to be 15.03% the *M. charantia* could be considered as a good source of protein. Sheriff *et al*., (2018) noted that the plant protein is still remain a potential source of food nutrient for the less privileged population in developing countries including Nigeria where cost of animal protein is beyond their per capital income (Sheriff *et al*., 2018).

CONCLUSION

The result of this resaerch revealed that, the Bitter gourd contain great array of phytochemicals**,** carbohydrate, protein, and fiber as well. Therefore, could be served a potential source of raw materials to both pharmaceutical and food industry.

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