PROXIMATE, MINERAL COMPOSITION AND PHYTOCHEMICAL ANALYSES OF TURMERIC (*CURCUMA LONGA*) POWDER

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ABSTRACT

This study focused on the proximate, minerals and phytochemical composition of turmeric powder extracts. Proximate composition of turmeric showed moisture, dry matter, protein, fibre, ether extract, ash and carbohydrate content of 5.59, 94.41, 8.73, 7.06, 5.61, 5.06 and 67.95 % respectively. The results showed that the rhizome powder contains appreciable and high qualities crude protein and carbohydrates of 8.73% and 67.95% respectively. The ether extract and ash of turmeric extract revealed the presence of phytate and oxalate. The phytochemical screenings of turmeric for various phytochemical constituents were conducted using laboratory mDethod. Preliminary phytochemical screening revealed the presence and quantitative analysis of alkaloid, flavonoid, glycoside, saponin, steroid, phenol, tannin, terpenoid and anthocyanin (3.21, 5.67, 1.05, 5.21, 5.42, 6.24, 2.45, 4.76, 1.78 mg/100g respectively) in the plants while carotenoid was not tested. The mineral composition analysis (ppm) ofturmeric rhizome indicates the presence of calcium (3.40), potassium (1.95), magnesium (0.90), zinc (0.44), phosphorous (1.85) and iron (0.20). The presence of nutrients proves that turmeric powder can be used as food supplement.

Keywords: **Turmeric, proximate, mineral composition, phytochemical**

INTRODUCTION

Phytogenics are a group of natural growth promoters or non-antibiotic growth promoters used as feed additives, derived from herbs, spices or other plants, they are also known as Phytogenics feed additives(PFA) or Phytobiotics. Examples of Phytogenics are garlic, turmeric, ginger, curry, onion et.c.Turmeric is a spice that gives curry its yellow color. *Curcuma longa linn,* commonly known as turmeric, is a tropical perennial monocotyledonous herbaceous plant of South and South-eastern Asia (Nwaekpe *et al.,* 2015). It belongs the family of Zingiberaceae (Jilani *et al.,* 2012). It has been used as both spice and medicinal herb. Recently, science has started to back up traditional claims that turmeric contains compounds with medicinal properties. These compounds are called curcuminoids, The most important one is curcumin. Curcumin is the main active ingredient in turmeric. It has powerful anti-inflammatory effects and is a very strong antioxidant. As the whole world is tending towards organic production, plants remain the richest and safest bio-reserve of feed supplements which, if fully explored will help to avert the problems of side effects associated with the frequent usage of synthetic medicine such as antibiotics. Therefore, there is need to replace antibiotics with probiotics in livestock industry since what animal consume will influence the quality of its products and consequently, the wellbeing of the consumer. Minerals are naturally occurring chemical compounds, usually of crystalline form and biogenic in origin. The mineral composition of turmeric including potassium (K), calcium (Ca), magnesium (Mg), and zinc (Zn), phosphorous (P) and iron (Fe) were determined using the atomic absorption spectrophotometer, as described the methods of AOAC (2005). Minerals are chemical constituents used by the body in many ways. They have important roles to play in many activities in the body. Minerals are classified as macro (major) and minor (trace) elements. Phosphorus was determined colorimetry method. The objective of this study is therefore to determine the proximate, minerals and phytochemical constituents of turmeric powder.

MATERIALS AND METHODS

Source and preparation of turmeric rhizome

Fresh turmeric rhizome was locally purchased at the Kabba market, Kogi State, North central Nigeria. Turmeric rhizomes were manually cleaned, peeled and cut into pieces, they were air dried under shade for

10days until crispy.The dried materials were milled into fine powder. The powdered samples were stored in a dry, clean container with tight lid for further analysis.

Preparation of extracts

Turmeric rhizomes were cleaned with distilled water, air dried for ten days and grounded into fine powder using sterile pestle and mortar under laboratory condition. Fifty (50) grams of the powder was mixed with 500ml of Distilled water and ethanol in a sterile conical flask separately and stand for 3 days with intermittent shaking. The mixtures were filtered using filter paper and concentrated in water bath at 70 °C for 3 hours. The extract was kept in a sterile container and refrigerated at 4 °C for further experiment.

Proximate analysis

Proximate analysis of turmeric was conducted to determine the Moisture, dry matter, ash content, crude protein, crude fibre,ether extract and Carbohydrate content was determined by calculating the difference between the sums of all the proximate compositions from 100%. Using methods described by Association of Official Analytical Chemist (AOAC, 2005). The proximate values were reported in percentages. Determination of ash content was done by ashing at 550^0C for 3 hours. The Kjeldah method (AOAC, 2005) was used to determine the crude protein contents by multiplication of the nitrogen value with a conversion factor (6.25). The crude fibre content of the sample was determined by digestion method and the lipid content was determined by Soxhlet extraction method (AOAC, 2005). Total soluble carbohydrat e was determined by the difference of the sum of all the proximate compositions from 100%.

Phytochemical analysis

The test samples were subjected to phytochemical analysis in order to find out the presence of phytochemical constituents. Saponin was determined by the method described by (AOAC, 2005). Alkaloids and flavonoid were determined by the method described by (Harbone, 1973). Phenol and Tannins were determined by the method described by (Markkar and Goodchild, 1996). Tannin was determined by the method described by Ikpeama *et al*.,(2014).

was quantified according to the procedure of Obadoni and Ochuko (2001). Tannin was calculated using the relationship described by Van- Burden and Robinson (1981)

W x AS x VA

where, W= weight of sample analyzed, AU= Absorbance of standard tannin solution, AS = Concentration (mg/ml) of standard tannin solution, VF = Total volume of filtrate, VA = volume of filtrate analyzed, D = dilution factor. **Statistical anal**

RESULTS AND DISCUSSIONS

Table 1: **Proximate and mineral composition of turmeric powder**

Parameters	**Content (%)**
Proximate composition	
Moisture content	5.59
Dry matter	94.41
Crude protein	8.73
Crude fibre	7.06
Ether extracts	5.61
Ash retention	5.06
Carbohydrate	67.95
Mineral composition	**Content (ppm)**
Calcium	3.40
Potassium	1.95
Magnesium	0.90
Zinc	0.44
Phosphorus	1.85
Iron	0.20

Table 2: **Phytochemical composition of turmeric powder**

Parameters	Content (mg/g)
Alkaloids	3.21
Flavonoids	5.67
Glycosides	1.05
Saponin	5.21
Steroids	5.42
Phenols	6.24
Tannin	2.45
Terpenoids	4.76
Anthocyanin	1.78

Proximate composition

Table 1 contains the proximate and mineral compositions of turmeric powder which showed that it has appreciable amounts of crude protein (8.73%), crude fibre (7.06%), ether extract (5.61%), ash (5.06%) and carbohydrate contents (67.95%). It also contains the following minerals, calcium (ppm) (3.40), potassium (1.95), magnesium (0.90), zinc (0.44), phosphorous (1.85) and iron (0.20). However, higher values were documented for fibre (27.06%) in turmeric powder. The ash content (5.06 %) turmeric shows that it has a reasonable amount of mineral. The result from this study agreed with the report of Ikpeama *et al.,* (2014), who reported that turmeric is an excellent source of carbohydrate and protein. The fibre content of 7.06% present is an advantage to livestock as it can contribute to the cleansing of the digestive tract thus preventing the absorption of excess cholesterol which is in line with the report of Ikpeama *et al.*, (2014), that fibre is known for its bulkiness to the food and it prevents the intake of excess starchy food, which prevent against metabolic conditions such as hypercholesterdemic. Calcium is important in sustaining strong bone, muscle contraction and relaxation, blood clotting, reduce blood pressure, and help in haemoglobin formation based on the presence of essential nutrients and minerals (Kubmarawa *et al.,*2007 and Ikpeama *et al.,*2014). Presence of essential nutrients and minerals in turmeric powder could be utilized to improve growth performance and health of status poultry. The variations between other researches could arise from soil type, soil nutrient, farming practices, geographical locations and varied environmental conditions.

Phytochemical composition

Table 2 showed the quantitative results of the present study suggested that several phytochemicals are present in turmeric extracts. Phytochemicals give plants their colour, flavour, smell and are part of a plant`s natural defense system and protect them against herbivorous insects and vertebrates, fungi, pathogens, and parasites (Bohm and Koupai, 1994). It has been reported in various studies that turmeric powder of different geographical regions has variabilities on the number of phytochemicals and some might not show compatibility due to unfavourable quality.The phytochemicals present in this study includes alkaloid, flavonoid, glycoside, saponin, steroid, phenol, tannin, terpenoid and anthrocyanin. This result showed that alkaloid (3.21%), flavonoid (5.67%), tannin (2.45%), glycosides (1.05%), saponin (5.21%), steroids (5.42%), phenol (6.24%), terpenoid (4.76%) and anthrocyanin (1.78%) content of turmeric extract revealed that there are abundant phytochemical. Phytochemical analysis is useful to detect the presence of the bioactive principle constituents in the plant which subsequently may lead to the discovery and development of medicinal drugs (Harshal *et al.,*2014). Flavonoids exhibit a range of biological activities, which is their ability to scavenge for biological radicals and superoxide anions radicals and thus has ability to promote health. Flavonoids also exhibits antiinflammatory, antiangionic, a nti allergic effects, analgesic and antioxidant properties. Tannins are also known antimicrobial agents. Tannins are water soluble plant polyphenols that precipitate proteins Prasad *et al.,* (2005). Tannins have been reported to prevent the development of microorganisms by precipitating microbial protein and making nutritional proteins unavailable for them. The growth of many fungi, yeasts, bacteria, and viruses was inhibited by tannins. Tannins are reported to have various physiological effects like anti-irritant,

antiphlogistic, antimicrobial and antiparasitic effects. Polyphenols are the most abundant antioxidants in diets. Alkaloid are crude extract used as medicinal agents in the form of tinctures and as fluid extracts where as some need further processing. Saponins are a special class of glycosides which have soapy characteristics. It has also been shown that saponins are active antifungal agents. Excess saponins can cause hypocholestrolaemia because it binds cholesterol making it unavailable for absorption (Soetan and Oyewole, 2009).

CONCLUSIONS AND APPLICATIONS

1. It has been reported in various studies that turmeric powder of different geographical regions has variabilities on the number of phytochemicals and some might not show compatibility due to unfavourable quality. Therefore, this study revealed that *Curcuma longa* are good sources of crude proteins, crude fat and minerals, carbohydrate, ash, moisture and crude fibre which have the potentials of being combined in livestock nutrition as feed supplements/additives.
2. They showed presence of some important Phytochemicals like alkaloids, tannins, phenolic compounds, phytate, Alkaloids, saponins and flavonoids thus suggesting more pharmacological active compounds in turmeric.
3. They contain essentials minerals like iron, potassium, phosphorus, calcium and vitamins which are very essential in the livestock nutrition.
4. Turmeric have the potentials of being used singly or can be combined in livestock nutrition for improved health and body growth.

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