International Journal of Applied Home Science ***RESEARCH PAPER***
Volume 3 (9&10), September & October (2016) : 346-350 ISSN : 2394-1413
Received : 25.08.2016; Revised : 05.09.2016; Accepted : 11.09.2016

Nutritional evaluation of commonly consumed therapeutic foods of Assam *(Musa bulbasiana, Cheilocostus specious* and *Colocasia esculenta*)

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ABSTRACT

Since time immemorial therapeutic foods have been a part of the diet of the indigenous as well as local people of Assam and it forms an integral part of the traditional health care system. The use of traditional foods as medicine has been practiced is widespread in China, India, Japan etc and some other South-Asian countries. India has a rich culture of medicinal herbs and spices, which include about more than 2000 species and has a vast geographical area with high potential abilities for Ayurvedic, Unani, siddha traditional medicines but only very few have been studied chemically and pharmacologically for their potential medicinal value. Assam offers immense scope for ethnomedicinal studies since it is inhabited by different tribes and sub-tribes. The aim of present study was to investigate the mineral composition and antioxidant activities of ethnic food namely *Musa bulbasiana, Cheilocostus speciosus, Colocasia affinis* of Assam which were widely used for therapeutic purpose. Among the minerals, the iron and calcium content were found highest in *Colocasia esculenta* which are 9.18 mg/100g and 47.07 mg/100g, respectively. *Cheilocostus speciosus* contained highest phosphorous and potassium content of 30.55 mg/100g and 110.46 mg/100g, respectively. The total antioxidant capacity of the foods was highest in *Colocasia esculenta* which was 243 mg/100g followed by *Musa bulbasiana* (51 mg/100g) and *Cheilocostus speciosus* (101 mg/100g) of sample as compared to ascorbic acid equivalents. The higher antioxidant capacity justifies the use of these plants for various ailments by traditional practitioners.

Key Words : Antioxidant, Ethnic, Therapeutic, Mineral

INTRODUCTION

Assam is a state in North-eastern India located to the south of the eastern Himalayas. Assam is one of the richest biodiversity zones in the world and consists of tropical rainforests, deciduous forests, riverine grasslands, bamboo (Borthakur, 2002). It is endowed with rich

Cite this Article: Das, Mamoni, Baruah, Mridula Saikia, Khatoniar, Sushmita, Baruah, Chandrama and Chatterjee, Lipika (2016). Nutritional evaluation of commonly consumed therapeutic foods of Assam *(Musa bulbasiana, Cheilocostus specious* and *Colocasia esculenta*). *Internat. J. Appl. Home Sci.*, **3** (9 & 10) : 346-350.

vegetation and medicinal plants. The people of the region have long experience in plant based traditional medicinal practices (Chakrabarty *et al.,* 2012). Plants produce compounds had an extensive history of use as therapeutic agents (Robinson, 1991). Numerous studies have shown that aromatic and medicinal plants are sources of diverse nutrient and non nutrient molecules, many of which display antioxidant properties and can protect the human body against both cellular oxidation reaction and pathogen (Wojdylo *et al.,* 2007). The medicinal values of these plants lie in their total antioxidant capacity, which produce definite physiological actions on the human body. They are also found to be rich in minerals (Yam *et al.,* 2008). According to World Health Organization (WHO), up to 80% of the world's population relies on traditional medicinal system for some aspect of primary health care (Hasan, 2010). Many floras are used in Assamese dietaries for culinary preparation which are accredited with various health beneficial nutrient compounds including protein, carbohydrate, minerals and fibre contribute to the antioxidant capacity (Betancur-Ancona *et al.,* 2004). *Musa bulbasiana* is a robust herd belonging to the family Musaceae and occurs both in wild habitat and cultivated in Assam, India. It is commonly known as *Bhimkol* and is known for its medicinal and therapeutic properties. The ripe pulp of *Musa bulbasiana* is widely used as baby food instead of commercially available food for children. From shoot and root part of *Musa bulbasiana*, a food additive is known as "Kolakhar" is prepared with antibacterial properties (Borborah *et al.,* 2016). Studies revealed *Musa bulbasiana* have antidiabetic, antilipidemic, and antioxidant property, and is used for the treatment of diabetes (Mudoi *et al.,* 2011). *Cheilocostus speciosus* is another traditional medicinal plant with important pharmacological properties. It is popularly known as *Jom lakhuti* and is used as food and medicine (Choudhury *et al.,* 2012). Juice of rhizome is applied to head for cooling and relief from head-ache, bruised leaves are applied in fever and dysentery. Stems are used against diarrhea cough, cuts, wounds, scabies, antidote for snake bite, jaundice, arthritis, burning sensation, constipation, leprosy, skin diseases, asthma, bronchitis, inflammations, anemia, intestinal warns and worm infection (Punyarani and Sharma, 2010). *Colocasia esculenta* (Family:*Araceae*) is an annual herbaceous plant with a long history of usage in traditional medicine in Assam. The herb has been known since ancient times for its curative properties and has been utilized for treatment of various ailments such as asthma, arthritis, diarrhoea, internal haemorrhage, neurological disorders, and skin disorders. Extracts from this plant have been found to possess various pharmacological activities (Yang *et al.,* 2005). The present study was carried out to evaluate the nutritional quality of these three ethnic plants of Assam having medicinal and therapeutic properties for its mineral content and total antioxidant capacity.

METHODOLOGY

The samples were collected from local markets of Jorhat district. Moisture, ash, calcium and potassium were estimated following AOAC standard methods (2000, 1984). Iron content was determined using Wong's method and phosphorous was estimated by method described by Fiske and Row (Ranganna, 1986). Methanolic extracts were prepared for estimation of the total antioxidant capacity of the samples by extracting 5g of sample in 50ml methanol. The total antioxidant capacity of the extracts was evaluated by the phosphomolybdenum

method according to the procedure described by Prieto *et al.* (1999). A 0.3 ml of extract was combined with 3 ml of reagent solution (0.6 M sulfuric acid, 28 mM sodium phosphate and 4 mM ammonium molybdate). The tubes containing the reaction solution were incubated at 95oC for 90 min. Then, the absorbance of the solution was measured at 695 nm using a UV-VIS spectrophotometer (UVmini-1240) against blank after cooling to room temperature. Methanol (0.3 ml) in the place of extract was used as the blank. The total antioxidant activity is expressed as the number of gram equivalent of ascorbic acid. The calibration curve was prepared by mixing ascorbic (1000, 500, 250, 125, 62.5 and 31.25 µg/ml) with methanol.

RESULTS AND DISCUSSION

Mineral contents :

Indigenous foods and plants play an important role in the health care system. Plant and food based drugs have paid great attention because it is easily available, less expensive and have no side effects. Various studies have revealed that different traditional foods as well as plants are a source of biologically active components which are very useful for treating various disease conditions. There have been revivals of interest in knowing about the traditional foods and plants and their by-products which are inherently safer and more efficacious than the modern synthetic drugs.

The highest moisture content was found in *Colocasia esculenta* which was 83.38 g/ 100g, while *Musa bulbasiana* contained lowest moisture content of 75.29 g/100g among the samples. High moisture content in *Colocasia esculenta* may be due to its succulent nature. The water content varies between individual vegetables depending on their chemical constituents, texture, structural differences and cultivation conditions which may have a marked effect on moisture content of vegetables (Florkowski *et al.*, 2009). *Colocasia esculenta* was having the highest ash content of 2.73 g/100g followed by *Cheilocostus speciosus* (2.46 g/100g) and *Musa bulbasiana* (2.12 g/100g). The iron content was found highest in *Colocasia esculenta* which was 9.18 mg/100g followed by *Cheilocostus speciosus* (6.41 mg/100g) and *Musa bulbasiana* (2.35 mg/100g). Calcium content was also found highest in *Colocasia esculenta* which was 47.07 mg/100g whereas calcium content of by *Cheilocostus speciosus* and *Musa bulbasiana* were 41.43 mg/100g and 17.20 mg/100g, respectively. *Cheilocostus speciosus* contained highest phosphorous and potassium content of 30.55 mg/100g and 110.46 mg/100g, respectively. The mineral content of the traditional foods of the present study were similar to the findings of Gupta *et al.* (2005), Caunii *et al.* (2010) and Kowsalya and Vidhya (2004).

Total antioxidant activity :

In the present study the total antioxidant capacity of the selected samples was evaluated

Table 1: Mineral constituents of the selected samples

Plants	Moisture (g/100g)	Ash (g/100g)	Iron (mg/100g)	Calcium (mg/100g)	Phosphorus (mg/100g)	Potassium (mg/100g)
Musa bulbasiana	75.29	2.12	2.35	17.20	18.32	91.64
Cheilocostus speciosus	80.22	2.46	6.41	41.43	30.55	110.46
Colocasia esculenta	83.38	2.73	9.18	47.07	22.96	78.25

by using Phosphomolybdate assay method. From the Fig. 1, it is observed that the total antioxidant capacity was highest in *Colocasia esculenta* which was 243 mg/100g of sample as compared to ascorbic acid equivalents. The antioxidant activity for *Musa bulbasiana* and *Cheilocostus speciosus* were 51 mg/100g and 101 mg/100g of sample per ascorbic acid equivalents, respectively. Higher antioxidant activity is observed in herbs and some medicinal plants due to presence of free radical scavengers like polyphenolic compounds in them (Aqil *et al.,* 2006).

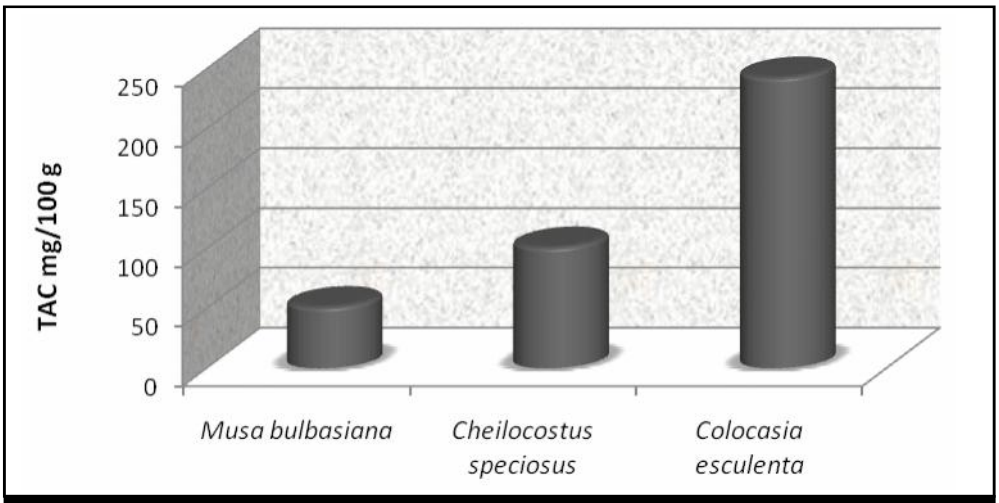

Fig. 1 : Total Antioxidant capacity of the selected samples

Conclusion:

This study has revealed that these medicinal plants of Assam posses good mineral profile as well as antioxidant activity. Free radicals, reactive oxygen species and reactive nitrogen species are generated by our body by various endogenous systems, exposure to different physicochemical conditions or pathological states. A balance between free radicals and antioxidants is necessary for proper physiological function. Antioxidant agents of natural origin have attracted special interest because of their free radical scavenging abilities. This work attempts to enrich knowledge of the nutritional properties of these plants as well as highlighting the importance of mineral contents. Throughout the world, there is increasing interest in the importance of dietary minerals in the prevention of several diseases. Minerals are of critical importance in the diet, even though they comprise only 4–6% of the human body. These include calcium, phosphorus, magnesium, sulphur, potassium, chloride and sodium. Trace minerals are essential in much smaller amounts, less than 100 mg per day, and make up less than 0.01% of bodyweight. Natural antioxidants that are present in indigenous foods are responsible for inhibiting or preventing the deleterious consequences of oxidative stress. The higher antioxidant capacity justifies the use of these plants for various ailments by traditional practitioners and these may provide protection against free radicals induced damage to biomolecules. The elucidation of element specification in these plants helps to interpret the therapeutic actions and thus may keep us free from health hazards.

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