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Study on Ethnic Manipuri Cuisine And Estimation of Phytonutrients in Centella Asiatica(Brain Food)

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Abstract: ***Cuisine has its own significant characteristics style of cooking which are specific to the particular region, country or culture. Manipuri cuisine comes from Manipur a state in North eastern India which is referred as „Jewel of India",also the land of fish, meat ,vegetables, rice and molasses and often described as "A pretty place more beautiful than many show places of the world". Green leafy vegetables are naturally rich in bioactive compounds and a wide range of phytonutrients having antioxidants and other health promoting properties. Manipuri cuisine consists of mainly the preparation of green leafy vegetables which contains lots of phytonutrients and gives health benefit to the body and kept the people of Manipur healthy. Centella asiatica is one of the plant used by the Manipuris for their preparation which is also known as "Brain food" and posses high medicinal values. But most of the phytonutrients are water soluble and their contents are mostly affected by the different processing methods.***

Keywords: Cuisine, Phytonutrient ,Bioactive compound, *Centella asiatica*

1. Introduction

There are more than 2500 known phytonutrients found in the plants. Phytonutrients not vitamins or minerals but referred as plants secondary metabolites which are present only in plants where it includes an array of bioactive compounds from medicinal and food plants makes able to improve human health and protect against the chronic degenerative disorders and also function as an antioxidants ,boosting the immune system ,anti-inflammatory, antiviral, antibacterial and cellular repair[11].But most of the phytonutrients are water soluble and their contents are mostly affected by the different processing methods.

Phytonutrients also helps to decrease the risk of developing certain cancers as well as diabetes, hypertension, and heart disease and also act as a detoxifying agents viz non- starch polysaccharides (NSP) or dietary fiber[6].

Centella asiatica of Apiaceae (Umbelliferae) family,commonly known as Indian Pennywort/Marsh Pennywort/Gotu kola (English) (Singh et al., 2010). It is also known as "Brain food" and posses high medicinal values.

Centella asiatica are rich source of bioactive compounds such as alkaloids, flavonoids, glycosides, phenolic compounds, triterpenoids, saponins and asiatic acid which posses neuroprotective potential against cerebral ischemia[3].

Centella asiatica is a mild adaptogen,antibacterial, antiviral, anti- inflammatory, antiulcerogenic, anxiolytic, nervine and vulnerary and can act as a cerebral tonic, a circulatory stimulant and a diuretic. It is useful in the treatment of anxiety and may be a promising anxiolytic agent in the future, diabetic micro angiopathy, edema, venous hypertension and venous insufficiency,the isolated steroids from the plant also used to treat leprosy[2].

Cooking brings about number of changes in physical and chemical composition of vegetables and also changes in the phytonutrients content of the plant besides increasing the palatability and improving the edibility of the foods[13].

Variety of effects like destruction, release and structural transformation of the phytochemicals take place during the cooking process. Cooking treatments like boiling, microwaving[13], baking, frying and griddling lead to changes in texture and nutritional properties of the vegetables.

Cooking can also lead to loss in essential vitamins and antioxidants, mostly water soluble and heat labile compounds. The extent of loss is dependent on the type of cooking treatment[7] and the phytochemical compositions of the cooked vegetable.

2. Methods and Materials

2.1 Sample Collection and Processing

For the analysis of the phytonutrients content of *Centella asiatica* the leaves were properly washed with tap water and then rinsed with distilled water, the water was drained completely and divide into two portion,one portion was shade dried without undergoing any processing for three to four days for complete removal of moisture and was ground to fine powder and another portion of Centella asiatica leaves were boiled in drinking water for 30 minutes and shade dried for three to four days go for complete removal of moisture. The dried leaves was ground to fine powder.

Extraction

Hundred gram of the dried powder of *Centella asiatica* extracted with 95 percent methanol (Merck) using soxhlet apparatus. The soxhletion with methanol was done for one week to obtain extract. After that, the extract was evaporated in water bath at 50 °C to obtain crude for phytonutrient analysis.

2.2 Test for the analysis of phytonutrients in *Centella assiatica*

Test for saponin content

Saponin content was estimated by ***Vanillin–Sulfuric acid assay*** . About 0.25 ml of diluted plant extract, 0.25 ml vanillin solution (10%) and 2.5 ml of sulphuric acid (72% w/v) were added and thoroughly mixed in an ice water bath. The mixture was warmed in a water bath at 60℃ for 10 minutes and then cooled in icecold water bath and the absorbance at 535 nm was recorded against the blank

Test for total flavonoids contents(TFC)

The total flavonoids content was determined using the colorimetric method by ***Abu Baker et al.*,(2009)**. About 0.5 ml of the extract was mixed with 2.25 ml of distilled water in a test tube followed by addition of 0.15 ml of 5 percent NaNO2 solution. After six minutes , 0.3 ml of a 10percent aluminium chloride with six molecule of water solution was allowed to stand for another five minutes before 1.0ml of 1M NaOH was added .The mixture was mixed well using a vortex. The absorbance was measured immediately at 510 nm using a spectrophotometer .Results were expressed as mg rutin equivalents in one gm of dried sample (mg RE/g).

Test for total phenolic contents(TPC)

The amount of total phenolics in extracts was estimated by the ***Folin- Ciocalteau method*** .3 ml aliquots of the diluted extracts were pipetted into different test tubes to which 0.5ml of Folin- Ciocalteau reagent and 2 ml of 20 percent (w/v) Na2CO3 solution were added. The tubes were placed in a boiling water bath for exactly one minute and then cooled under running tap water. The absorbance of the resulting blue solution was measured at 650 nm with a spectrophotometer. The amount of phenolics present in the sample was determined from a standard curve prepared with catechol and was expressed in mg per gram of the dry extract.

Total Antioxidant Activity

The total antioxidant activity was measured according to ***spectrophotometric method of Preito et al.*,(1997)**.Various concentrations of crude extract ((2 µg- 20 mg / ml)/ml) dissolved in distilled water in eppend off tubes were combined with 1ml of reagent solution containing 0.6 M sulphuric acid, 2.8 mM sodium phosphate and 4mM ammonium molybdate .The tubes were capped and incubated at 90 ˚C for 90 minutes, after cooling to room temperature, the absorbance was measured at 695 nm against blank.

3. Results and Discussion

Estimation of Phytonutrients in Centella Asiatica

The phytonutrients content of raw and boiled form were analysed with reference to saponnin, flavoniods, total phenolic contents and total antioxidant activity.

Total Saponin content

Saponin are naturally occurring suface active glycosides (Riguerra, 1997), it promote wound healing by reducing lipid peroxidase levels in wound while it increased enzymatic (Superoxide dismutase,catalase,glutathione peroxidase) and non-enzymatic (Vitamin E and ascorbic acid) antioxidant level.

The total saponin content were determined by ***Vanillin-Sulfuric acid assay*** in the two form of Centella asiatica viz raw and boiled form. The raw form obtained 11mg/100g and boiled obtained 9mg/100g(fig:1).The total saponin content was more in raw form than in boiled form as saponin are water soluble compound and they tend to lose on boiling and losses are accelerated when the cooking time and temperature are increased. Thus, the present study parline with [1] that the method of processing had an effect on the content of total saponin content.

Total Saponin Content of Centella Asiatica (Raw and Boiled Form)

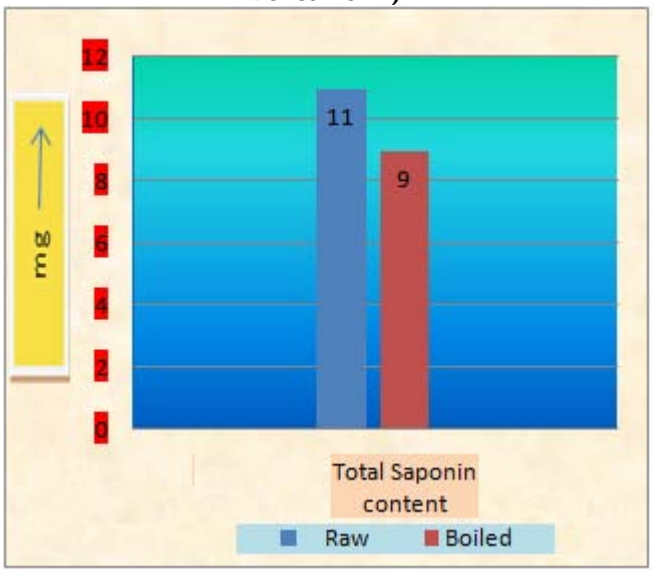

Figure 1: Total saponin test shows that the content of saponin is higher in raw form than in boiled form

Total Phenolic Content

Phenolic compounds are a class of antioxidant agents which act as free radical terminators(Shahidi,1992). Total phenolic content of Centella asiatica were determined by the ***Folin-Ciocalteau method*** in the two form viz raw and boiled form.The raw form obtained 17.5mg/100g and boiled obtained 13.6mg/100g(fig:2). The total phenolic content was more in raw form than in boiled form as cooking method ,cooking time and temperature has a negative effect on phytochemicals content and also phenolic compounds are water soluble compound and tends to lose on boiling.Thus,the method of processing affect the content of total phenolic content in *Centella asiatica*[1].

Total Phenolic Content of Centella Asiatica (Raw and Boiled Form

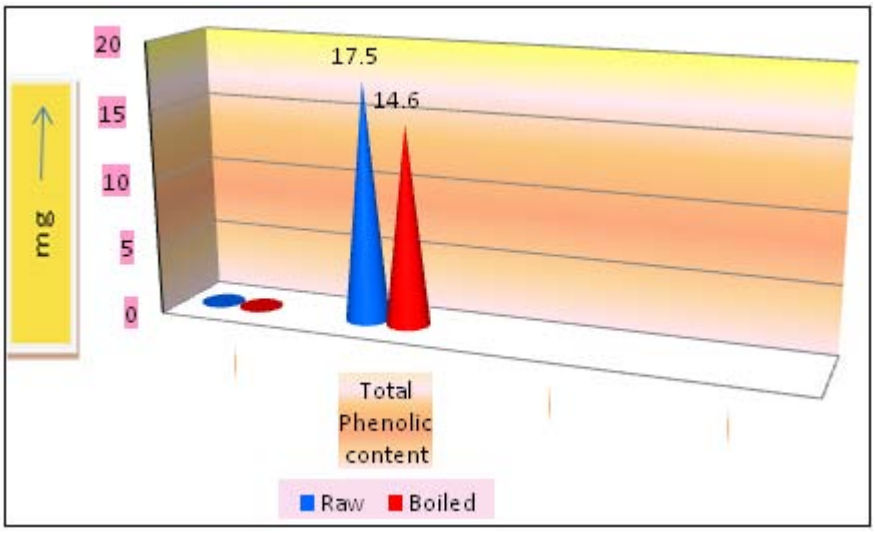

Figure 2: Total phenolic test shows that the content of phenolic is higher in raw form than in boiled form.

Total Flavonoids content

Flavonoids are polyphenolic compounds that are ubiquitous in nature, they usually act as an antiviral, anti-allergic, antiplatelet, anti-inflammatory, antitumor and antioxidant. The total flavonoids content were determined by the method followed ***by Abu Baker et al., (2009)*** in the two form of *Centella asiatica* viz raw and boiled form. The raw form obtained 15.7mg/100g and boiled obtained 13.4mg/100g (fig:3). Boiling of *Centella asiatica* softens the cell walls which leads to loss of flavonoids which are water soluble and heat labile compounds.Thus the total flavonoid content in *Centella asiatica* was more in raw form than in boiled form[8].

Total Flavonoids Content In Centella Asiatica (Raw and Boiled Form)

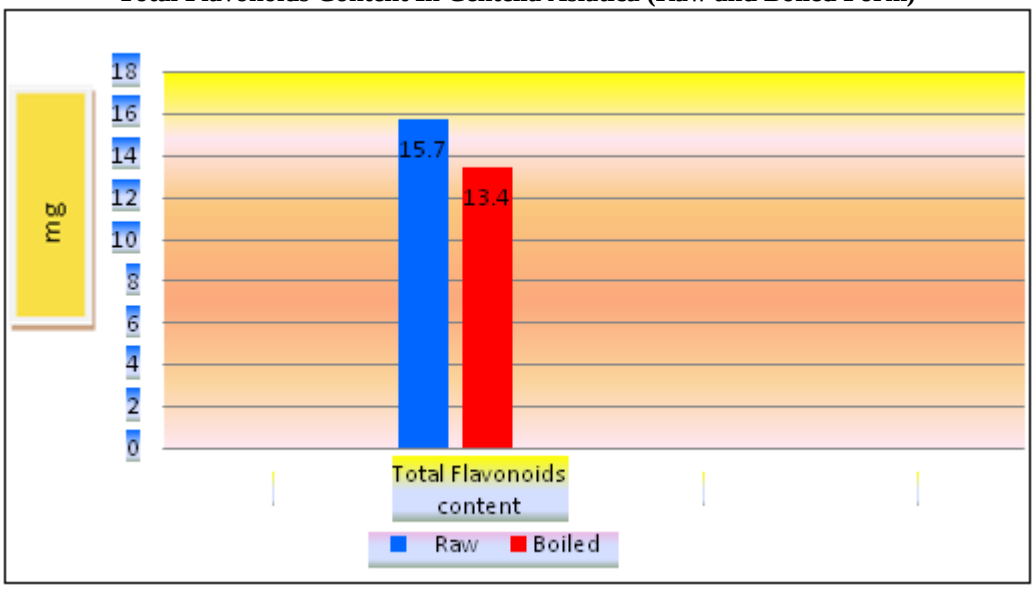

Figure 2: Total Flavonoids test shows that the content of total flavonoids is higher in raw form than in boiled form

Total Antioxidant Activity

Antioxidants are vital substance that neutralised or 'mop up' molecules called free radicals that can harm the body cells. Free radicals react with cell membranes and other structures such as DNA, lipids and proteins by stealing electrons from these molecules and causing damage. Thus, antioxidants are able to neutralise free radicals by using their own electrons to the free radicals and therefore prevent cellular damage[4].

The total antioxidant activity were ***determined by spectrophotometric method of Preito et al., (1997)*** in the two form of *Centella asiatica* viz raw and boiled form. The raw form obtained 18.2mg/100g and boiled form obtained 15.23mg/100g(fig:4). The antioxidant content of *Centella asiatica* is affected by the way of its processing,they tend to loss in boiling with water as they are mostly water soluble compounds and hence the total antioxidant activity was more in raw form than in boiled form of *Centella asiatica* [5].

Comparison Of Total Antioxidant Activity In The Raw And Boiled Form Of Centella Asiatica

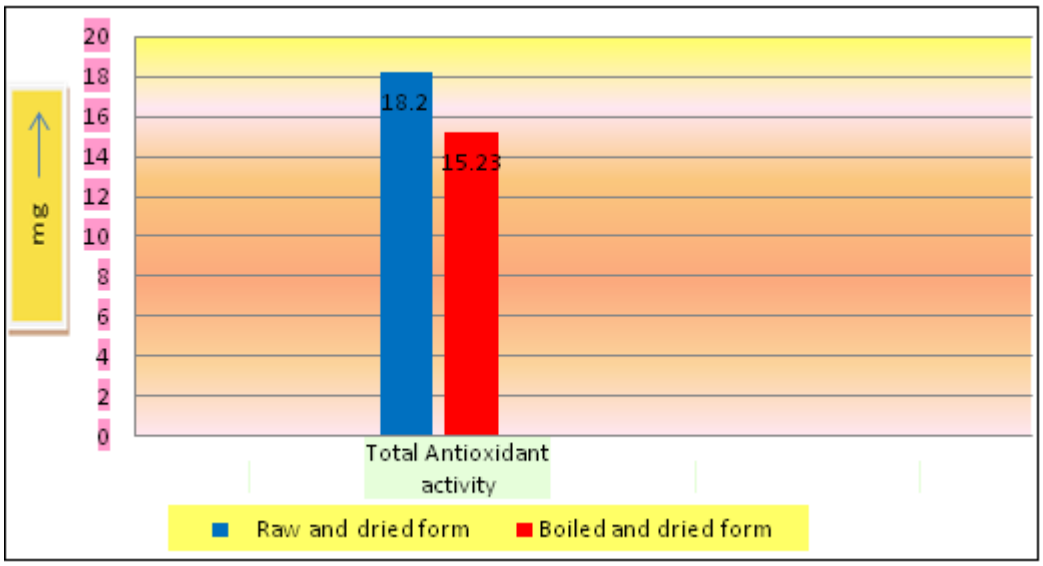

Figure 2: Total antioxidant test shows that the content of total antioxidant is higher in raw form than in boiled form.

4. Conclusion

The results presented here clearly show that cooking not only enhance the palatability and improve the edibility of food but also bring about number of changes in physical characteristics and chemical composition of vegetables by softening the cell wall and therefore make the phytonutrients of cooked *Centella asiatica* quite different from that of uncooked as many phytonutrients are water soluble compounds, so losses are greater in boiling. This is probably due to variety of effects like destruction and leaching of the phytonutrients which are soluble in water. Therefore ,from the above discussed results, it could be inferred that different processing methods ,time and temperature of cooking had a negative impact on the contents of phytonutrients

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