EVALUATION OF NUTRITIONAL COMPOSITION AND ANTIOXIDANT ACTIVITY OF HERBAL LEAVES

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ABSTRACT

Medicinal plants is a best way to add their nutritional benefits in the daily diet of humans to combat with various degenerative diseases. The study was carried out with objectives to determine the nutritional composition and antioxidant activity of medicinal leaves Adusa and Giloy. Chemical analysis for proximate contents of leaves as well as products was done by using the standard procedure of AOAC. Iron, calcium and Vitamin C contents were determined by Thiocyanate method (colometric), volumetric method and 2, 6-Dichlorophenol dye method respectively. Total carotene content was analysed by the method given by Ranganna, 2001 while Polyphenol content and % radical scavenging activity were assessed by the Folin-Ciocalteu method and DPPH method respectively.

KEYWORDS: Adusa, Antioxidant Activity, Giloy, Herbal leaves, Nutritional Composition.

INTRODUCTION

Adusa (Adhatoda vasica) has been used for the treatment of respiratory disorders namely acute and chronic cough, bronchitis and asthma. It is also used as an expectorant in the
treatment of acute and chronic bronchial catarrh and pulmonary diseases. The leaves, as well as, the flowers, fruits and roots are extensively used for the treatment of cold, whooping cough, asthma and as anthelmintic and the leaf extract is known to cure diarrhea, dysentery and glandular tumor. The different parts of the plant is used in the Indian traditional medicine for the treatment of various diseases like asthma, joint pain, lumber pain and sprains, cough, eczema, malaria, rheumatism, swellings, venereal diseases. In homeopathy, *A. vasica* has been used in the treatment of cold, cough, pneumonia, spitting of blood, fever, jaundice, catarrh, whooping cough and asthma (Sharma, 2012).

Tinospora cordifolia also known as Giloy or Guduchi, is an indigenous climber plant indigenous to tropical areas of India, Myanmar and Sri Lanka. Its stem and leaves is used for treatment of fever, jaundice, emaciation, skin ailments, diabetes, anaemia and various infectious diseases. The study was undertaken to evaluate the proximate and elemental analysis of the stems of *Tinospora cordifolia*. The proximate analyses were carried out using standard methods, while mineral elements were analyzed using Atomic Absorption Spectrophotometer, equipped with air acetylene flame. The proximate analysis of the stems of *Tinospora cordifolia* showed that it contained moisture 34.39%, ether extract 0.912%, crude protein 7.74%, crude fibre 56.42%, total ash 7.96%, nitrogen free extract 26.97%, cellulose 23.02% and hemicellulose 3.70%. The mineral analysis of the stems showed that they contain the following essential minerals: Calcium (102.23 ppm), phosphorous (24.81 ppm), iron (26.058 ppm), copper (3.733 ppm), zinc (7.342 ppm) and manganese (12.242 ppm). The study revealed that Tinospora cordifolia stems to be a potential source of nutrition and minerals for man as well as animals (Sharma, 2014).

OBJECTIVES OF THE STUDY
To analyze the nutritional composition and Antioxidant Activity of fresh and dehydrated herbal (*Adusa* and *Giloy*) leaves.

MATERIALS AND METHODS
Experimental site: The present investigation was carried out in the Nutrition Research, Laboratory of the Department of Foods and Nutrition, Ethelind School of Home Science, SHIATS, Allahabad.
**Procurement of raw materials:** Healthy Fresh leaves, *Adhatoda vasica* (Adusa leaves) and *Tinospora cordifolia* (Giloy leaves) for the experiment will be collected from the university campus of the SHIATS, Allahabad.

**Preparation of dehydrated green leaves powder: (Adusa and Giloy leaves)**

1. **Leaves** (Free from insects and diseases)
2. Washing
3. Blanching for 3 minutes with water containing 2% salt and 10% citric acid
4. Drain out with excess water
5. Spreading on flat aluminum trays
6. Tray drying at 60 - 65° for 15 hours (Adusa) and 8 hours (Giloy)
7. Dehydration till the moisture become 6 – 8%
8. Grinding into powder
9. Storage (At ambience temperature in dry place)

(Source: Srivastava and Kumar, 2009)

**Fig3.2: Flow diagram of dehydration of leaves**

Fresh leaves on dehydration give -
*Adusa* - 1kg edible portion yield 100g dehydrated powder.
*Giloy* - 1kg edible portion yield 150g dehydrated powder.

**Nutritional composition of fresh and dehydrated leaves powder (Adusa and Giloy leaves)**

Following analysis was done by using AOAC 2005 and Rangana 2001 standard procedure-

- **Determination of moisture** - by Hot air oven method.
- **Determination of ash** - by Combustion method.
- **Determination of protein** - by Lowry Method (1951)
- **Determination of fat** - by Soxhlet method.
• **Determination of fibre**- by Extraction method.
• **Determination of carbohydrate**- Carbohydrate was done by difference method.
• **Energy value**- Calculated by multiplying the figure for percentage of protein, fat and carbohydrate by 4, 9 and 4 respectively and adding the figure obtained.
• **Determination of iron**- by colorimetric method.
• **Determination of calcium**- Volumetrically (AOAC 2007).
• **Determination of vitamin C**- by 2,6- Dichlorophenol dye method (AOAC 2007).
• **Total carotene** – OD by Spectrophotometer. *(Ranganna 2001)*

**Analysis of Antioxidant Activity of fresh and dehydrated leaves**

- Total phenolic content will be determined by using Folin-ciocalteau reagent. *(Singleton *et al.*, 1999)*
- Estimation of Flavanoids will be done by Aluminium chloride method describe by Krishnaveni (2014)
- Determination of percent radical scavenging activity by DPPH Radical Scavenging method *(Brand *et al.*, 1995)*.

**Statistical Analysis**: The data obtained from sensory evaluation were statistically analyzed by using analysis of variance technique (two way classification) and critical difference and T-test *(Gupta and Kapoor, 2002)*.

**RESULT AND DISCUSSION**

The result obtained from the analysis are presented and discussed below-

**Table 1. The Proximate composition, minerals and vitamins of fresh and dehydrated Adusa and Giloy leaves per 100 g.**

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Adusa <em>(Adhotoda vasica)</em> (100g)</th>
<th>Giloy <em>(Tinospora cardifolia)</em> (100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fresh</td>
<td>Dehydrated</td>
</tr>
<tr>
<td>Moisture %</td>
<td>48.66</td>
<td>11.34</td>
</tr>
<tr>
<td>Ash%</td>
<td>5.2</td>
<td>2.7</td>
</tr>
<tr>
<td>Carbohydrate(g)</td>
<td>16.4</td>
<td>68.78</td>
</tr>
<tr>
<td>Protein(g)</td>
<td>1.30</td>
<td>6.5</td>
</tr>
<tr>
<td>Fat(g)</td>
<td>1.6</td>
<td>2.5</td>
</tr>
<tr>
<td>Fiber(g)</td>
<td>2.76</td>
<td>6.4</td>
</tr>
<tr>
<td>Iron(mg)</td>
<td>5.8</td>
<td>17.38</td>
</tr>
<tr>
<td>Calcium(mg)</td>
<td>23.6</td>
<td>56.07</td>
</tr>
<tr>
<td>Vitamin C(mg)</td>
<td>3984</td>
<td>2365</td>
</tr>
<tr>
<td>Beta carotene (µg)</td>
<td>1276</td>
<td>1856</td>
</tr>
<tr>
<td>Energy (kcal)</td>
<td>125</td>
<td>307.32</td>
</tr>
</tbody>
</table>
The results is supported by the findings of Gopalan et al., 2004, Sundriyal and Sundriyal, 2004. They analyzed the proximate nutritional content of *Adhotoda vasica* leaves which showed about 5.90% ash, 51.66% moisture content, 3.60% crude fat, 7.2 protein, 70.6% carbohydrate, 6.90% crude fibre and 310.90 Kcal/100g energy value. The study concluded that the leaves of *Adhotoda vasica* were rich in carbohydrate, energy, crude fibre.

Similarly Hussain et al., (2009) conducted a study on “Proximate and Elemental Analyses of *Tinospora cordifolia* leaves” and found that dehydrated Giloy had the high level of calcium, protein, iron, crude fibre and ash with values 218mg, 7.74%, 26.058% and 7.96% respectively.

**Table 2. Antioxidant activity of fresh and dehydrated Adusa and Giloy Leaves per 100g**

<table>
<thead>
<tr>
<th>Antioxidant Activity</th>
<th>Adusa (<em>Adhotoda vasica</em>) (100g)</th>
<th>Giloy (<em>Tinospora cordifolia</em>) (100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fresh</td>
<td>Dehydrated</td>
</tr>
<tr>
<td>Polyphenols (mg)</td>
<td>34</td>
<td>88.77</td>
</tr>
<tr>
<td>Flavanoids (mg)</td>
<td>14.50</td>
<td>51.28</td>
</tr>
<tr>
<td>% Anti-Radical Activity</td>
<td>68</td>
<td>97.33</td>
</tr>
</tbody>
</table>

Similiarly, Devinder Kumar Chauhan et al., (2014) conducted a study on “Analysis of leaves of *Tinospora cordifolia*, leaves of nutritional and Phytochemical composition” and found that dehydrated Giloy had the high level of Flavonoids 24.7, %Anti Radical Scavenging Activity 26.2, Polyphenols 16.4 respectively.

**CONCLUSION**

From the present study, Comparison of chemical composition of *Adusa* leaves per 100g of dry basis in percent study shows that carbohydrate, protein, fat, fiber, calcium, iron, Beta carotene and energy content were higher and respectively in dehydrated *Adusa* leaves powder than in comparison with fresh *Adusa* leaves. Vitamin C was higher in fresh leaves than dehydrated leaves powder.

Comparison of chemical composition of *Giloy* leaves per 100g of dry basis of percent study shows that carbohydrate, protein, fat, fiber, calcium, iron and energy content were higher respectively in dehydrated *Giloy* leaves powder in comparison with fresh *Giloy* leaves. Vitamin C and Beta carotene was higher in fresh leaves than dehydrated leaves powder.
Antioxidants activity found in fresh and dehydrated Adusa and Giloy leaves per 100grams analyzed by chemical analysis tabulated in Table no.2 are as follows- Polyphenols, Flavanoids, Percent Anti- Radical Scavenging Activity content were higher respectively in dehydrated leaves powder in comparison with fresh leaves.

RECOMMENDATIONS

- Incorporation of fresh and dehydrated leaves mixture of Adusa and Giloy will enhance the nutritive value of traditional recipes by improving their micronutrient content.
- Incorporation of dehydrated leaves mixture powder in various recepies can be helpful for therapeutic purposes and can be included in the diets of people with various diseases like anti-inflammatory, diarrhea, dysentery, Immune enhanced, antioxidant. it is recommended to be included in the diet of all age groups because of its healthy benefits.

REFERENCES

