ANALYSIS OF ANTIOXIDANTS ACTIVITY, PHENOLIC CONTENT AND VITAMIN-C OF CLITORIA TERNATEA

Preethika Aaleti and Anil B

Department of Nutrition, Capital Degree and PG College – Shapur Nagar, Hyderabad-55, Telangana, India

ABSTRACT: Butterfly pea flower (Clitoria ternatea) it comes under Fabaceae family because it is a plant in a pea family it is a stunning wildflower in pea family, Darwin pea, bluebellvine. It is a rare species in southern America. The study was aimed at evaluating the antioxidant activity and Total phenolic content of the Methanolic extract of Butterfly pea flower. The results showed that DPPH Antioxidant Activity exhibited 80.15 % of inhibition against the free radical’s by DPPH method, total phenolic content was1434.3 (μg/g) and vit-c is 14.64 (mg/100g). The extract was found to contain excellent amounts of antioxidants, phenolic compounds and fair amounts of vitamin C. As Clitoria ternatea is also rich in vit-c & antioxidants it has been linked to many impressive health benefits, such as boosting antioxidant levels, lowering blood pressure, protecting against gout attacks, improving iron absorption, boosting immunity, and reducing heart disease and dementia risk. Dry Butterfly pea flowers rated highest organoleptic properties when compared to fresh Butterfly pea flowers during the sensory evaluation.

Keywords: Butterfly pea flower, Antioxidant activity, Phenolic content, Vitamin-c activity

INTRODUCTION

Clitoria ternatea, regularly known as butterfly pea, is a perennial herbaceous plant from the fabaceae family, recently it has a lot of interest as it has potential applications both in advanced medicine and agriculture and as a source of natural food colour additive and antioxidants (Georgiana K et al 2019). It is used as traditional ayurvedic drug, it is assigned with various qualities including memory enhancing, smart drug which helps in reducing stress and also used as antianxiety drug, antidepressant, antispasmodic, tranquilizing, and relaxing properties (Mukherjee et al 2008). In traditional Chinese medicine, the plant has been attributed properties affecting female libido due to its likewise appearance to the female reproductive organ (Fantzz and Paul 2000). Using its extract have also shown its ability to reduce intensity of behavior caused by serotonin and acetylcholine (Jain Neeti, 2003). Butterfly pea flower tea is a commonly used in many herbal teas, mixed drinks, and cosmetic products. It is rich in antioxidants and may be linked to several health benefits, including increased weight loss, better blood sugar control, and improvements in hair and skin health. Butterfly pea flower rich in several anti-oxidants, vitamin -c and phenolic compounds including ternatins, kaempferol, p-coumaric acid, and delphinidin-3,5-glucoside (Rachel Ajmera 2021).

Mostly it is consumed in the form of beverages like herbal tea by using the petals either with the dry flowers or with the fresh flowers. The earthy flavour of butterfly-pea flower tea is said to be a mood enhancer. The tea is said to have stress-busting effects that may also help reduce symptoms of anxiety. It is also known to refresh the brain, bolster energy levels and stamina, influence positive emotions and thereby increase productivity at work (Netmds.com). Most of butterfly pea flower’s benefits are due to its supply of antioxidants, which are responsible for its signature blue colour. As butterfly pea flower is rich in antioxidants they act as scavenger free radicals from the body cells and prevent or reduce the damage caused by oxidation neutralize free radicals by giving up some of their own electrons. They reduce oxidative stress, support disease prevention, support eye health, aid in brain function & contribute to mental health improvements. They can reduce inflammation & support healthy aging processes.

Phenolic compounds act as vital role in defense responses, such as anti-aging, anti-inflammatory, antioxidant and anti-proliferative activities. Phenolic compounds can be used to treat various common human ailments, including hypertension, metabolic problems, incendiary infections and neurodegenerative diseases.

MATERIALS & METHODS

The flowers of Clitoria ternatea were collected from the home plants in Shapur Nagar, Hyderabad, Telangana. The petals were removed from the collected flowers, washed with distilled water and were shade dried. The dried petals were ground into fine powder using a mortar and pestle. The powdered shade dried petals were further used for the extraction process and stored in airtight bottles.

Solvent Extraction (Methanol Extraction)

10 grams of flower powder were weighed and added to 100 ml of organic solvent (methanol) in a conical flask. After 24 hours, it was filtered using a thin muslin cloth and centrifuged at 5000 rpm for 15 minutes. The precipitate was then gathered in a round base jar and the dissolvable was separated to make the last volume of one-fourth of the first volume, giving a convergence of 40 μg/0.1ml. It was put away at 40°C in water/air proof jugs for additional studies.
Determination of Antioxidant Activity by DPPH method

The methanol extracts with various fractions (10, 50, 100, 200, 400, 600, μg/ml) were arranged utilizing methanol. In a solution of 1-100 g/ml, ascorbic acid served as the standard. 5 ml of the DPPH solution was mixed separately with 5 ml of the extract solution and standard solution after being prepared in ethanol to 0.004 percent. let the solutions in dark for 30 mins. The extent to which DPPH purple changed color to DPPH yellow indicated the extract's capacity for scavenging. The absorbance of the mix was resolved at 517 nm utilizing UV-Visible Spectrophotometer and ascorbic corrosive was filled in as a positive control. Lower absorbance of the response blend showed higher free extremist searching activity. (Debasis nayak,2012).

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\% \text{DPPH scavenging effect} = \left(\frac{A_0 - A_1}{A_0}\right) \times 100
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Where \(A_0\) - Control reaction absorbance, \(A_1\) - Testing specimen absorbance

Determination of Vitamin -C

About 100 g of the sample powder was exhaustively extracted with ethanol. The extract was Concentrated to a residue. The crude extract was stored in sterilized bottle and kept in a Refrigerator for further use. 10 ml of each filtrate was mixed with 20% glacial acetic acid in a 100 ml standard flask which was made up to 100 ml with distilled water.

Dye preparation: The standard dye solution was prepared by dissolving 50mg of blue dye in 50 ml of distilled water. The mixture was diluted to 200ml, filtered and kept.

Preparation of standard ascorbic acid solution: This was prepared by dissolving 100mg Crystalline ascorbic acid in 50 ml of 20% glacial acetic acid and diluted to 100 ml with Distilled water. Titration procedures: 10 ml of the ascorbic acid solution was titrated with the dye solution. Each drop of the dye in contact with the solution turns pink. The end point was reached when the pink colour lasts for 10 seconds. Similarly, 10 ml of each sample prepared was in turn Titrated with the due and the titre values were noted (Pankaj K Tyagi 2018)

Determination of Total Phenolic Content

The total phenolics of the extracts were determined using the Folin and Ciocalteu reagent, following the method described by Singleton and Rossi with slight modifications. Sample and standard readings were made using a spectrophotometer (Cary 50 Bio UV-Vis Spectrophotometer, Varian) at 765 nm against the reagent blank.

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\text{The test sample (0.2 mL) was mixed with 0.6 mL of water and 0.2 mL of Folin-Ciocalteu’s phenol reagent (1 : 1). After 5 min, 1 mL of saturated sodium carbonate solution (8% w/v in water) was added to the mixture and the volume was made up to 3 mL with distilled water. The reaction was kept in the dark for 30 min and after centrifuging the absorbance of blue color from different samples was measured at 765 nm. The phenolic content was calculated as gallic acid equivalents GAE/g of dry plant material on the basis of a standard curve of gallic acid (5-500 mg/L, Y=0.0027x-0.0055, R^2=0.9999) all determinations were carried out in triplicate (Suman Chandra et al 2006).}
\]

Sensory Evaluation

Sensory evaluation is done between the fresh butterfly pea flowers and dried butterfly pea flowers after making tea with dry and fresh flowers. Where panelists are asked to rate the acceptability of the samples by 5 point hedonic for the evaluation. The parameters are aroma, taste, colour, consistency, mouth feel and overall acceptability.

Statistical Analysis

Statistical analysis performed by T test to compare between the samples of Butterfly Pea Flower dry and fresh. Mean and Standard Deviation calculated by MS EXCEL for Sensory analysis.

RESULT AND DISCUSSIONS

The preliminary phytochemical investigation of the metabolic extracts of Butterfly Pea Flower (Clitoria Ternatea) showed the presence of Antioxidants, Total phenols and Vit-C Quantitative estimation of phytochemical and vitamin C in methanol.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Parameters</th>
<th>Result</th>
<th>Method of Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Anti-oxidant Activity (%inhibition)</td>
<td>80.15</td>
<td>DPPH method</td>
</tr>
</tbody>
</table>
Table 1: Biochemical Analysis of Butterfly Pea Flower

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vit-c (mg/100gms)</td>
<td>14.64 mg/100gm</td>
</tr>
<tr>
<td>Total phenols (mg/100gms)</td>
<td>1434.3mg/100gm</td>
</tr>
</tbody>
</table>

As table 1 shows, methanolic Concentrate of butterfly pea flower displayed brilliancy Antioxidant Activity in the DPPH Technique, that is 80.15% of Inhibition against the free radicals for 100g.14.64mg/100g of L-ascorbic acid. Total phenolic content was around 1434.3mg/100g, appearance a lot of phenolic content. All the Antioxidants help protect cell from damage caused by free radicals, which are molecules produced when the body breaks down food or when exposed to radiation, tobacco, smoke or pollution. Thus, protecting the body from malicious diseases, dietary intake of antioxidants from Clitoria Ternatea flowers help in prevention of cell damage. Similarly, when compared with (TNM Taun putra et al 2021) Total phenol content was 28.8GAE/100g which is less than the present study that is 1434.3mg/100g (Lihsien et al 2018) got a result of 10.36mg/100g which is less than present research study.

Sensory evaluation
Mean and standard deviation of the two samples A (Dry flower) & Sample B (fresh wet flower) are represented in Table 2:

Table 2: Sensory Evaluation of Dry & Fresh Butterfly Pea Flower

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sample A (Dry flower)</th>
<th>Sample B (Fresh wet flower)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aroma</td>
<td>4.10 ± 0.64</td>
<td>3.85 ± 0.93</td>
</tr>
<tr>
<td>Taste</td>
<td>4.05 ± 0.60</td>
<td>3.90 ± 0.85</td>
</tr>
<tr>
<td>Colour</td>
<td>4.35 ± 0.59</td>
<td>4.05 ± 0.76</td>
</tr>
<tr>
<td>Consistency</td>
<td>4.60 ± 0.60</td>
<td>4.45 ± 0.69</td>
</tr>
<tr>
<td>Mouth feel</td>
<td>4.30 ± 0.66</td>
<td>4.15 ± 0.75</td>
</tr>
<tr>
<td>Overall acceptability</td>
<td>4.20 ± 0.62</td>
<td>4.15 ± 0.81</td>
</tr>
</tbody>
</table>

According to the sensory analysis results, sample A (dry flower) scored the highest on the hedonic scale with aroma (4.10), Taste (4.05), color (4.35), consistency (4.60) and overall acceptability (4.20) compared to sample B (wet fresh flower) with aroma (3.85), taste (3.90), color (4.05), consistency (4.45), and overall acceptability (4.15).

Statistical Analysis:
The significance p value is (p=0.05) and need to be compared with other sensory parameters

Table 3: Statistical analysis of butterfly pea flower (Clitoria Ternatea)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>P(T&lt;=t)two</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aroma</td>
<td>0.143261</td>
</tr>
<tr>
<td>Taste</td>
<td>0.263312</td>
</tr>
<tr>
<td>Colour</td>
<td>0.93206</td>
</tr>
<tr>
<td>Consistency</td>
<td>0.189632</td>
</tr>
<tr>
<td>Mouth feel</td>
<td>0.240518</td>
</tr>
<tr>
<td>Overall acceptability</td>
<td>0.412612</td>
</tr>
</tbody>
</table>

The above Table 3 represents that Aroma, Colour, and Consistency is significant difference shown, where Taste, mouth feel and over all acceptability is not significant.

CONCLUSION
Butterfly Pea Flower has many medicinal and nutrition benefits that had beneficiary effect on human body. Butterfly pea flower showed Better amount of Antioxidant activity, Total Phenolic content and Vitamin-C content. In Sensory analysis Dry Butterfly Pea Flower showed higher acceptable score compared to fresh wet Butterfly Pea Flower. Clitoria ternatea is used for curing many diseases and fight against free radicals that causes damage to the body.

References


11. Rachel Ajmera 2021 health line

