A STUDY ON TOTAL PHENOLIC AND FLAVONOID CONTENT OF HELICTERES ISORA IN DIFFERENT SOLVENTS

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ABSTRACT

*Helicteres isora* is recognized by its medicinal properties and its used in herbal medicine. The present study was designed for screening Total Phenolic Content (TPC) and Total Flavonoid Content (TFC) in two different solvents. Out of the two solvents TPC and TFC of *Helicteres isora*, methanolic extract was found to be the highest i.e. 196.66±0.503 mg/g GAE for TPC and 137.33±4.041 mg/g Rutin for TFC respectively. The results support the use of *Helicteres isora* as for therapeutic use and may have a significant amount of antioxidant activity.

KEYWORDS: Total Phenolic Content, Phytochemicals, Methanolic, Galic Acid, Rutin, Folin-Ciocalteu.

1. INTRODUCTION

Therapeutic use of herbs and their Total Phenolic and Flavonoid Content shows a positive impact on antioxidant research. Since the Vedic period the herbs and herbal products are used as medicine for various types of treatments. Depending on traditional medical knowledge, most of the modern medicines are isolated from plant based agents. Thus, plants and herbs contribute a major share in traditional and modern medicinal system for health care[^1]. The bioactive compounds present in plants like alkaloids, flavonoids, tannins and phenolic compounds are the source of its medicinal value that produces a definite physiological and biochemical action on the body[^2]. *Helicteres isora* belongs to the family Sterculiaceae. It has been frequently used as an astringent and blood-purifer[^3]. It is commonly found in India from Jammu eastwards to Nepal, Bihar, Central, Western and Southern India, West Bengal, and the Andaman islands. Due to screw like structure of its
fruit it is commonly known as screw plant, Enthani, Marodphali, Marorphali, etc. It is a medium size tree attaining a maximum high of 5m. It is shown in Literature that *Helicteres isora* plant shows antioxidant, anti-inflammatory, antipyretic, and antispasmodic activities. Presence of flavones, triterpenoids, cucurbitacin, phytosterols, saponins, sugars and phlobatannins. The root and stem barks are considered to be expectorant, demulcent, astringent and anti-galactagogue and are useful in colic, scabies, empyema, gastropathy, diabetes, diarrhea and dysentery. The fruits are astringent, acrid, refrigerant, demulcent, constipating, stomachic, vermifuge, vulnerary, haemostatic and urinary astringent. They are useful in vitiated conditions of pitta ophthalmitis, colic, flatulence, diarrhea, dysentery, verminosis, wounds, ulcers, hemorrhages, epistaxis and diabetes.

2. MATERIALS AND METHODS

2.1 Plant material

*Helicteres isora* fruits were collected from central India. The specimen was identified and confirmed by Dr. Zia ul Hassan HOD, Department of Botany, Saifia Science collage, Bhopal, India. (Authentication No 407/Bot/Saif/16)

2.2 Extraction

Dried and powdered raw material was defatted with petroleum ether and then soxhleted with ethyl acetate and methanol. The extraction was carried out by soxhletion to complete extraction.

2.3 Determination of Total Phenolic Content (TPC)

The total phenolic content (TPC) was determined by spectrophotometry, using gallic acid as a standard, according to the Folin-ciocalteu method described by Maurya S. and Singh D. Total phenolic content were expressed as mg/g gallic acid equivalent (GAE). Concentration of 0.01, 0.02, 0.03, 0.04 and 0.05 mg/ml of gallic acid were prepared in methanol. Concentration of 0.1 and 1 mg/ml of plant extract were also prepared in methanol and 0.5 ml of each sample were introduced into test tube and mixed with 2.5 ml of a 10 fold dilute folin ciocalteu reagent and 2 ml of 7.5% sodium carbonate. The tubes were covered with parafilm and allowed to stand at room temperature for 30 minutes. Absorbance at 760nm was recorded spectrophotometrically. Experiments were performed in triplicate.
2.4 Determination of Total Flavonoid Content (TFC)

Total flavonoids were measured by a colorimetric assay according to Dewanto et al.\cite{14} An aliquot of diluted sample or standard solution of rutin was added to a 75 \mu l of NaNO₂ solution, and mixed for 6 min, before adding 0.15 mL AlCl₃ (100 g/L). After 5 min, 0.5 mL of NaOH was added. The final volume was adjusted to 2.5 ml with distilled water and thoroughly mixed. Absorbance of the mixture was determined at 510 nm against the same mixture, without the sample, as a blank. Total flavonoid content was expressed as mg rutin/g dry weight (mg rutine/g DW), through the calibration curve of Rutin. All samples were analysed in three replications.

3. RESULTS AND DISCUSSION

Methanol and Ethyl acetate extract of Helicteres isora were prepared to examine the total phenolic and flavonoid content. The total phenolic content using the Folin ciocalteu’s reagent is expressed in terms of gallic acid equivalent (the standard curve equation: y=0.0055x + 0.0653, \(R^2=0.9759\)). A standard curve of galic acid and rutin are shown in Fig.1 and Fig.2. The values obtained for the concentration of total phenols are expressed as mg of GA/g of extract. The contents of total phenols in various Helicte res isora extract are mentioned in table 1.

![Gallic Acid](image-url)

**Fig 1. Standard Curve of Gallic Acid**
Table 1: Total Phenolic Content (expressed as mg/g Gallic acid equivalent) of Helicteres isora extract

<table>
<thead>
<tr>
<th>Sample</th>
<th>Total Phenolic Content ± SD</th>
</tr>
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<tbody>
<tr>
<td>Methanolic extract</td>
<td>196.66±0.503</td>
</tr>
<tr>
<td>Ethyl acetate extract</td>
<td>161.60±0.800</td>
</tr>
</tbody>
</table>

The total Flavonoid content is expressed in terms of Rutin equivalent (the standard curve equation ;\(y=0.0015x+0.1205\) \(R^2 = 0.9881\)). The values obtained for the concentration of total Flavonoid are expressed as mg of Rutin/g of extract. The contents of total Flavonoids in various Helicteres isora extract are mentioned below in table 2.

Table 2: Total Flavonoid content (expressed as mg/g Rutin equivalent) of Helicteres isora

<table>
<thead>
<tr>
<th>Sample</th>
<th>Total Flavonoid Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methanolic extract</td>
<td>137.33±4.041</td>
</tr>
<tr>
<td>Ethyl acetate extract</td>
<td>75.33±3.055</td>
</tr>
</tbody>
</table>

In the present study TPC and TFC of Helicteres isora methanolic extract was found to be the highest i.e. 196.66±0.503 mg/g GAE and 137.33±4.041 mg/g Rutin followed by Helicteres isora ethyl acetate extract i.e. 161.60±0.800 mg/g GAE and 75.33±3.055 mg/g Rutin.

According to a previous mentioned work on Helicteres isora of P K Basniwal et al., the TPC is found to be 7.04% equivalent of gallic acid and TFC was found to be 2.4 mg/g and equivalent to rutin. Loganayaki et.al 2011, found maximum TPC in Methanol extract.
Phenolics or polyphenols are secondary plant metabolites that are most commonly present in plants of high medicinal value. Phenolic compounds contribute to the antioxidant potential of plants by neutralizing free radicals and preventing decomposition of hydroperoxides into free radicals\(^\text{[15]}\). Flavonoids are one of the most common and belonging to universally occurring group of plant polyphenolic compounds. Flavonoids are responsible for the radical scavenging effects of most medicinal plants through scavenging or chelating process \textit{in vivo} as well as \textit{in vitro}\(^\text{[16]}\). Helicteres isora has shown significant amount of Phenolic and Flavonoid compounds in its fruit extract in both the solvents i.e Methanolic and Ethyl Acetate extract. The Plant \textit{Helicteres isora} may be used as nutritive supplement and can also be used as a therapeutic agent, it may also have a good antioxidant value.

4. CONCLUSION

\textit{Helicteres isora} is a natural product rich in polyphenols, flavonoids and other various kinds of phytochemicals. Results shown in our study shows that \textit{Helicteres isora} methanolic fruit extract is a rich source of phenolic compound and flavonoids. Ethyl acetate extract also have significant amount of phenolic and flavonoid content in it. This concludes that, \textit{Helicteres isora} show significant amount of Phenolic and Flavonoid compounds and may be used as a potential antioxidant agent. The Plant \textit{Helicteres isora} may be used as nutritive supplement and can also be used as a therapeutic agent.

REFERENCES