Evaluation of Anti-Oxidant and Anti-Pyretic Activity of Fruit of Garcinia Padunculata

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ABSTRACT

Most of the synthetic drugs used at present as analgesic and anti-inflammatory agents cause many side effects and toxic effects. Many medicines of plant origin with analgesic and anti-inflammatory activity have been used since long time without adverse effects. The purpose of the study was to explore the anti-pyretic and anti-oxidant activity of fruits of Garcinia pedunculata. The fruit of G. pedunculata was collected from Shillong, Meghalaya and extraction is done by using methanol as a solvent. The methanol extract shows the presence of carbohydrate, glycoside, alkaloids, phenol and flavonoids. Acute anti-pyretic activity for the extract was investigated in pyrexia rat. Temperature level was determined after 1 hours, 4 hours, 8 hours and 12 hours after giving the extract dose of 100mg/kg and 200mg/kg body weight, and it was found to produce a significant reduce in fever. DPPH radical scavenging activity (in-vitro anti-oxidant activity of G. pedunculata) of methanolic extract shows 38.31 as IC₅₀ (μg/ml) whereas Ascorbic acid as standard in the same concentration shows 34.81 IC₅₀ (μg/ml). The obtained result justified the traditional use of G. pedunculata as anti-pyretic and antioxidant purpose.

Keywords: G. pedunculata, Anti-pyretic, pyrexia rat, Anti-oxidant, DPPH

ARTICLE INFO: Received 11 April 2020; Review Completed 28 May 2020; Accepted 10 June 2020; Available online 15 June 2020

Cite this article as:

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INTRODUCTION:

Fever or pyrexia is an elevated body temperature above the normal level ranges 36.5–37.5 °C (97.7–99.5 °F) characterized by an increase in thermoregulatory set point, which results from the interaction of the central nervous and immune system. Fever is body’s natural defense mechanism against infectious agent which can damage the tissue. This triggers the enhanced formation of pro-inflammatory cytokines like necrosis factor TNF-α, interleukin1[β], Prostaglandin PGE-2 which increases near the hypothalamus area and thereby triggers the hypothalamus to elevate the body temperature. The treatment for pyrexia is mostly done by using synthetic NSAID which are very toxic to the body, thus it has been focus on the medicinal plant which having large numbers of evidences and has increased their uses all over the world as various folk medicines.

Generation of free radicals or reactive oxygen species (ROS) from various metabolism or may be environmental sources has found to interact continuously in biological system and their uncontrolled formation may directly correlates with the molecular basis of various diseases along with the lipid peroxidation. Plants are rich in antioxidants; so much attention has been directed towards the development of ethnomedicines because of their safety profile and reach in valuable chemical constituents such as phenols, flavonoids, alkaloids, glycosides, tannins, vitamins, terpenoids, and many more phytochemical constituents which are responsible for various pharmacological activities. Recent research data has reported that ingestion of the natural antioxidants has been found to be associated with less risk of many graded diseases.

Garcinia. pedunculata, popularly known ashor thekera in Assamese and soh danei in khasi, it is an evergreen tree related to the more familiar purple mangos teen (Garcinia mangostana). Garcinia is well flourish in evergreen forest mostly available in areas having low rain fall. It grows wild in the Ri-Bhui region of state Meghalaya and also in suntpur district, Assam, having a high content of polyphenols, flavonoids, tannins, alkaloids, glycosides and ascorbic acid which are natural anti-oxidant and anti-
aflatoxins that help in preventing the coronary artery disease and atherosclerosis. There are claims that it has a number of medicinal benefits right from the anti-diarrheal, anti-diabetic, anti-cancer to anti-flatulent. Besides cure and control of disease G. pedunculata protects internal organs like liver, kidneys, and pancreas.

**MATERIAL AND METHODS:**

Collection of the plant material was done from Shillong, Meghalaya, identification and authentication of plant material G. pedunculata used in this study were obtained from The Department of Botany, Guwahati University, Assam, India.

**Preparation of plant extract:**

G. pedunculata fruits were dried at room temperature until a constant weight was obtained then pulverized into fine powder. 100g powder was taken for soxhlet extraction by using 1000 ml of methanol as solvent for 72 hours. The mixture was filtered and evaporated to dryness under reduced pressure in a rotary evaporator. The extract was reconstituted into doses of 150, 300 and 600 mg/kg body weight which were used for the experiment.

**In-vitro antioxidant activity:**

**DPPH radical scavenging activity:**

The free radical scavenging activity of six different essential oils was measured by 2,2-diphenyl-2-picrylhydrazyl (DPPH). One ml of 0.1 m mol solution of DPPH in methanol was mixed with 0.3 ml of methanolic extract of G. pedunculata in various concentration (20, 40, 80, 160 mcg/ml) during 30 min at room temperature and the absorbance was recorded at 517 nm using UV visible spectrophotometer. Each experiment was performed with appropriate blank. A positive control without extract was used for parallel way. The scavenging activity of the extract was estimated base on the percentage of DPPH radical scavenged (1%) using equation:

\[
\%\text{ Inhibition} = \left(\frac{A_{\text{control}} - A_{\text{sample}}}{A_{\text{control}}}\right) \times 100
\]

Where A sample is the absorbance of a sample solution, and A control is the absorbance of the control solution (containing all of the reagents, except the test sample).

**In-vivo Anti-pyretic activity:**

The experiments were designed by taking groups rats (n=6) were injected subcutaneously with 10/kg body weight of 10% yeast solution to induce hyperthermia. The rectal temperature of each animal was recorded prior to the 24 hours of yeast solution injection. Thereafter, the test group was treated orally with 1ml (500 mg/kg body weight) crude suspension of methanolic extract of G. pedunculata. Similarly for positive control group 1 ml (4 mg/kg body weight) aqueous solution of Indomethacin was give orally. Post treatment the rectal temperature of each animal was measured and recorded at 60, 90, 120 minutes. Each reading was calculated as the mean of three readings.

**Experimental animals:**

Healthy rats (50-60gm) were used for testing the antipyretic activity. Animal were procured and kept in animal house for 15 days prior to the study. All the procedure was carried out as per the norms and regulation of CPCSEA and IAEC of Assam down town University which has approved the study (AdtU/IAEC/2017/03, dated 11/11/2017).

**RESULTS AND DISCUSSION:**

**Qualitative Phytochemical Estimation:**

The methanolic extract was examined for preliminary phytochemical screening by using different standards test reagent shows the presence of alkaloids, phenolic groups, tannins, glycosides flavonoids and carbohydate the investigation, on the basis of secondary metabolites as shown in (Table1).

**Table1:** Phytochemical screening of methanolic extract of G. pedunculata fruit.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Constituents</th>
<th>Test</th>
<th>Methanolic Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alkaloids</td>
<td>Mayer’s reagent</td>
<td>++</td>
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<tr>
<td></td>
<td></td>
<td>Dragendorff’s reagent</td>
<td>++</td>
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<tr>
<td></td>
<td></td>
<td>Hager’s reagent</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wagner’s reagent</td>
<td>++</td>
</tr>
<tr>
<td>2</td>
<td>Flavonoids</td>
<td>Aqueous NaOH</td>
<td>++</td>
</tr>
<tr>
<td>3</td>
<td>Glycosides</td>
<td>Borntrager’s reagent</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Legal test</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Keller kiliani test</td>
<td>++</td>
</tr>
<tr>
<td>4</td>
<td>Tannins and Phenols</td>
<td>Ferric chloride test</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lead acetate test</td>
<td>++</td>
</tr>
<tr>
<td>5</td>
<td>Carbohydrate</td>
<td>Molisch’s reagent</td>
<td>++</td>
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<td></td>
<td></td>
<td>Fehling’s reagent</td>
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<tr>
<td></td>
<td></td>
<td>Benedict reagent</td>
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<tr>
<td></td>
<td></td>
<td>Selivanford’s reagent</td>
<td>--</td>
</tr>
<tr>
<td>6</td>
<td>Saponin and Triterpenoids</td>
<td>Foam test</td>
<td>--</td>
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<tr>
<td></td>
<td></td>
<td>Haemolysis test</td>
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<td></td>
<td></td>
<td>Saikowski test</td>
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</tbody>
</table>
DISCUSSION:

DPPH (2,2-diphenyl-1-picrylhydrazyl) is the most commonly used free radicals for testing the preliminary radical scavenging activity of the plant extract. Scavenging of DPPH radical is related to the inhibition of lipid peroxidation. An antioxidants either it transfer an electron or a hydrogen atom to the DPPH, result into neutralization of free radical character. In this investigation, the effect of methanolic extract the DPPH radical scavenging was concomitantly increasing with increase in the concentration of methanolic extracts of the fruits from 10 to 50µg/ml. The percentage of inhibition obtained were ranging from 32.06 at 10µg/ml to 58.29 at 50 µg/ml with 38.31 as anIC₅₀ (µg/ml) for the extract and for positive control (ascorbic acid) were 34.05 at 10µg/ml and 61.25 at 50 µg/ml with 34.81 as anIC₅₀ (µg/ml). (Table: 3). From the obtained results it can conclude that the species *G. pedunculata*, possess hydrogen donating capabilities for methanolic extract and does it undergoes scavenging of free radicals.

CONCLUSION:

This investigation confirmed the ethnomedicinal claim about the anti-pyretic and anti-oxidant use of fruits of *G. pedunculata* plant. In the perspective of identifying traditional herbal drugs which might be useful in preventing excessive and also because of the harmful side effects of synthetic products. The methanolic extract of *G. pedunculata* fruits shows a promising anti-pyretic activity. These studies suggest that it is having a source of active compound that can prevent the increase in temperature and its complications; the anti-oxidant activity was estimated by comparing with a standard anti-oxidant Ascorbic acid. The obtained result concluded that *G. pedunculata* has a good anti-pyretic and anti-oxidant activity.

ACKNOWLEDGEMENT:

Authors are greatly thankful to Dr. Biplab Kumar Dey, Principal and Dean, Dr. Raja Chakraborty and Dr. Saikat Sen Associate Professor Faculty of Pharmaceutical Science Assam Down Town University, Guwahati-26, Assam, India, for their support and help.

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