Evaluation of Bioactive Compounds and Antihyperlipidemic Activity of *Erythrina indica* in Albino Wistar Rats

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**Abstract:** *Erythrina indica* is a member of the family, Leguminosae. The present study was carried out to evaluate the antihyperlipidemic activity of ethanolic extract of *Erythrina indica* leaf. Phytochemicals for the characterization of Antihyperlipidemic Activity. The present study to evaluate the antihyperlipidemic activity of ethanol extract of *Erythrina indica* leaf. Ethanolic extract of *Erythrina indica* leaf at two dose levels doses level 200mg/kg and 400mg/kg for 28 days resulted in the reduction of TC, TG, LDL, VLDL and HDL level in the high fat diet which induced hyperlipidemia in rats. The results are compared to standard drug, Simvastatin 5mg/kg. It was noticed that the Ethanolic extract of *Erythrina indica* reduced the Antihyperlipidemic Activity when compared with positive control.

**Key words:** *Erythrina indica* • Phytochemical • Antihyperlipidemic activity

**INTRODUCTION**

Medicinal plants are of great importance to the health of individuals and communities in general. The medicinal value of plants lies in some chemical substances that produce a definite physiological action on the human body [1]. Medicinal plants are the “backbone” of traditional medicine, which means more than 3.3 billion people in the less developed countries utilize medicinal plants on a regular basis. It is thought that about 80% of the 5.2 billion people of the world live in the less developed countries and the World Health Organization estimates that about 80% of these people rely almost exclusively on traditional medicine for their primary healthcare needs [2].

Excessive quantities or improper types of lipid-intake may result in hyperlipidemia which is characterized by an abnormal elevation in one or more of the serum lipids such as total cholesterol, triglycerides and low density lipoprotein cholesterol. Hyperlipidemia is considered to be a major risk factor for cardiovascular diseases including atherosclerosis, myocardial infarction, heart attacks and cerebrovascular diseases [3, 4].

*Erythrina indica* Lam is a common plant found in south India. It is known as kalyanamurungai in Tamil [5]. In siddha system, it is being considered useful for treating antihelmenthesis, sedative, anti-inflammatory, nematocidal and worm infection [6]. A medium sized, quick growing tree with trifoliate leaves, coral red flowers in dense racemes and oblong seeds red to dark brown in colour. Roots, barks and leaves are used as folk medicine, bark used in diabetes and dysentery, leaves are in rachitic joins and roots are used in spleen disease [7]. Phytochemicals play important role in plant metabolism such as carbohydrate,proteins, alkaloids derived from amino acids, terpenes are a group of lipids and phenolic from carbohydrate. Plants produce a very impressive array of antioxidant found from natural occurrence [8-10].

The presence of active constituents’ viz. Alkaloids, Glycosides, Phenyl coumarin have been reported from root and seeds. Antihyperlipidemic activity in leaf extract of *Erythrina indica* Lam, an attempt has been made to explore such activity for *Erythrina indica* Lam. In the present work cold maceration ethanolic extracts were evaluated for antihyperlipidemic activity [11, 12].

**MATERIAL AND METHODS**

**Collection of Plant Material:** *Erythrina indica* were collected from the Government Veterinary Hospital campus, Vellode, Tamilnadu.
Preparation of Extract [13]: The air dried leaves were pulverized into coarse of particle and extracted exhaustively with ethanol by cold maceration for 48 hrs. The ethanolic leaf extract were collected and dried in room temperature. The dried ethanolic leaf extract were used for the following experimental analysis.

Phytochemical Analysis: Preliminary phytochemical screening of leaves of *Erythrina indica* were carried out using standard laboratory procedures, to detect the presence of different secondary metabolites (phytochemical constituents) such as alkaloids, flavonoids, saponins, tannins, steroid, glycosides, phenols, carbohydrates, proteins, terpenoids, fatty acid, cardio glycosides etc.

**In vivo** Studies

**Experimental Animal Model [14]:** Wistar rats (150-180gm) of either sex approximately the same age procured from listed suppliers of Nandha College of Pharmacy, Erode,. They were housed in polypropylene cage and fed with standard rodent pellet diet and water.

**Acute Toxicity Study (OECD) [15]:** Acute toxicity was preformed for the extracts to as certain the safe dose by acute oral toxic class method. The ethanol extracts were at the dose level of 200mg/kg and 400mg/kg.

The animals were divided into five groups of six each, marked to individual identification and kept in their cages. Group 1: Normal diet and water (control), Group 2: 20% cholesterol enriched diet for 4 weeks (cholesterol), Group 3: 20% cholesterol enriched diet + standard drug (simvastatin), Group 4: 20% cholesterol enriched diet + test drug 1 (200mg/kg), Group 5: 20% cholesterol enriched diet + test drug 1 (400mg/kg). The normal pellet diet was grinded to fine particles and given to group 1. To the fine particles add 45% cholesterol and 25 ml coconut oil and given to groups group 2, 3, 4 and 5.

The ethanolic extract was taken for the following studies due to high glycoside content.

**Invivo** studies - Antihyperlipidemic Studies

**Table 1: Preliminary Phytochemical Screening Analysis**

<table>
<thead>
<tr>
<th>Phytochemicals</th>
<th>Fresh Leaf Juice extract Result</th>
<th>Ethanol Extract Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Flavanoids</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Saponins</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Tannins</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Steroids</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Glycosides</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Proteins</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Cardiac glycosides</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Fatty acid</td>
<td>_</td>
<td>_</td>
</tr>
</tbody>
</table>

Note: + = Present - = Absent

The ethanolic extract was taken for the following studies due to high glycoside content.

**Table 2: Antihyperlipidemic Activity of Ethanolic Extract of *Erythrina indica***

<table>
<thead>
<tr>
<th>Group</th>
<th>Cholesterol (mg/dl)</th>
<th>Triglycerides (mg/dl)</th>
<th>LDL (mg/dl)</th>
<th>VLDL(mg/dl)</th>
<th>HDL (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>97.87±7.5</td>
<td>123.74±12.2</td>
<td>38.6±3.2</td>
<td>24.6±1.6</td>
<td>34.67±2.8</td>
</tr>
<tr>
<td>Negative control</td>
<td>236.4±9.1</td>
<td>283.62±22.6</td>
<td>158.2±8.9</td>
<td>56.7±4.2</td>
<td>21.5±1.8</td>
</tr>
<tr>
<td>Positive control</td>
<td>148.3±10.2</td>
<td>208.56±14.2</td>
<td>66.47±11.6</td>
<td>41.6±3.8</td>
<td>40.23±1.4</td>
</tr>
<tr>
<td>Test drug200 mg/kg</td>
<td>159.5±7.8</td>
<td>220.6±3.15</td>
<td>64.04±8.6</td>
<td>44.9±2.4</td>
<td>40.9±4.6</td>
</tr>
<tr>
<td>Test drug400mg/kg</td>
<td>150.2±9.4</td>
<td>190.6±15.6</td>
<td>66.2±5.8</td>
<td>38.1±3.6</td>
<td>41.56±3.2</td>
</tr>
</tbody>
</table>

Values were mean±SEM; n = 6, *P< 0.01, When compared to positive control, *P< 0.01, When compared to negative control (one way ANOVA followed by dunnett’s test)
In a 4weeks week study period serum cholesterol level was and it was found that 200 mg /kg test drug was found to be significantly high compared to 400 mg/kg test drug and it is nearer to the positive control simvastatin drug. This shows that the extracts has antihyperlipidemic activity. Similar results were absorbed in the studies carried out for evaluation of antihyperlipidemic activity of leaves of Portulaca oleracea linn against dexamethasone induced hyperlipidemia in rats [14].

The serum triglyceride test for the study was done at the end of the study period and the result observed shows that 200 mg/kg test extract is showing higher activity compared to 400mg/kg dose and it also exhibits activity as positive control. The study conducted [16] in Antioxidant and Antihyperlipidemic activity of Hibiscus sabdariffa Linn. leaves and calyces extract in rats analysed and it was found that 200 mg /kg test drug was found to be significantly high compared to 400 mg/kg test drug and it is nearer to the positive control simvastatin drug. The serum triglyceride test for the study showed the result that 200 mg/kg test extract is showing higher activity compared to 400mg/kg dose and it also exhibits activity as positive control.

The Serum VLDL test for the study reveals that both the concentrations (200&400 mg/kg) are effective and both 200 mg/kg has higher activity as positive controls. Also the serum HDL test reveals that the concentrations 200 and 400 mg/kg are effective against the negative control. The HDL test is considered to have antihyperlipidemic activities. This study is supported by a similar research work carried out for Antihyperlipidemic activity of Divyamethipachak against triton –x 100 induced hyperlipidemia rats [18].

CONCLUSION

The aim of the present study was to elucidate the role of Erythrina indica during hyperlipidemia induced rats and to study its antihyperlipidemic activity.

Several plant species endowed with the phytochemicals have been documented to serve as a potent antihyperlipidemic agent. The Phytochemical study for the fresh leaf and the ethanol extract reveals that the plant possess alkaloids, flavonoids, saponins, tannins, steroids, glycosides, carbohydrates and proteins of which glycoside are important for antihyperlipidemic activity.

Antihyperlipidemic study for ethanolic extract of Erythrina indica shows serum cholesterol level was analysed and it was found that 200 mg /kg test drug was found to be significantly high compared to 400 mg/kg test drug and it is nearer to the positive control simvastatin drug. The serum triglyceride test for the study showed the result that 200 mg/kg test extract is showing higher activity compared to 400mg/kg dose and it also exhibits activity as positive control.

The serum triglyceride test for the study shows that 200 mg/kg &400 mg/kg showed similar results with positive control for LDL serum assay and it helps to conclude the plant can possess antihyperlipidemic activity. Antihyperlipidemic activity of methanolic extract of Rhina canthusnasutus [17] also shows the similar results.

Thus the ethanolic extract with two concentrations 200 mg/kg &400 mg/kg showed similar results with positive control for LDL serum assay and it helps to conclude the plant can possess antihyperlipidemic activity. The Serum VLDL test for the study reveals that both the concentrations 200 and 400 mg/kg are similar to positive control. Thus the ethanolic extract in both high and low dose provides protection against hyperlipidemia by decreasing the level of total cholesterol, triglycerides, LDL, VLDL and increasing...
the HDL level. HDL gives protection against many cardiac problems and obesity and the *Erythrina indica* plant can be taken in the regular diet for its activity.

To conclude the *Erythrina indica* plant was found to possess antihyperlipidemic activity and further research can be carried to study its synergestic and other activities.

**REFERENCES**