PRELIMINARY PHYTOCHEMICAL ANALYSIS AND ANTIPYRETIC, PURGATIVE STUDIES OF JATROPHA GOSSYPIFOLIA


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ABSTRACT

Jatropha gossypifolia (Euphorbiaceae) a common garden plant in tropical countries has been used as a traditional medicine. Plants are well known as a major source of modern medicines. From ancient times, humans have utilized plants for the treatment or prevention of diseases, leading to the dawn of traditional medicine. Jatropha gossypifolia is one of the plants that are used in Chinese, Ayurvedic and Thai traditional medicine for the treatment of fever, pain and dysentery. Preliminary phytochemical studies and Antipyretic, Purgative activities of ethyl alcohol and acetone extracts were investigated using albino rats of both the sexes. The phytochemical screening of ethanolic extracts of Jatropha gossypifolia leaves shows the presence secondary metabolites such as Saponin, Tannins, Phenols, Steroids, Glycosides, Flavonoids etc., The ethanolic and acetone extract of Jatropha gossypifolia have significant antipyretic activity and purgative activity. So the present study confirms the presence of valuable chemicals in Jatropha gossypifolia leaves and highlights the real potential of Jatropha gossypifolia leaves extracts in the preparation of versatile antipyretic and purgative drugs in future.

Keywords: Jatropha gossypifolia, Phytochemical studies, Antipyretic, purgative.
INTRODUCTION

Plants which have one or more of its organs containing substances that can be used for the therapeutic purpose are called medical plants.\(^1\) Plants are known to have beneficial the therapeutic effect documented in traditional Indian system of medicine. Much work has been done on ethno medicinal plant in India. Interest in a large number of traditional natural products has increased\(^2\) tremendously. Herbal medicines have been used for thousands of years in many parts of the world. India has 45,000 plant species and among them 8000 medicinal plants and 1200-2500 aromatic plants are present.\(^3,4\) There is a world wide agreement over the present need to develop novel agents to treat bacterial and fungal infections that have become unresponsive to standard antimicrobial therapy\(^5\) and also for other diseases. In recent years, secondary plant metabolites (phytochemicals), previously with unknown pharmacological activities, have been extensively investigated as a source of medicinal agents.\(^6\) Thus, it is anticipated that phytochemicals with adequate antibacterial efficacy will be used for the treatment of bacterial infections.\(^7,8\)

Phytochemicals, help the human body in a variety of ways. Phytochemicals may protect human from various diseases. Phytochemicals are non-nutritive plant chemicals that have protective or disease preventive properties. Phytochemicals are basically divided into two groups that is primary and secondary metabolites; according to the functions in plant metabolism, primary metabolites comprise common sugars, amino acids, proteins and chlorophyll while secondary metabolites consist of alkaloids, flavonoids and tannins.\(^9\)

*Jatropha gossypifolia* belongs to the family Eurphorbiaceae The common name for *Jatropha gossypifolia* is pignut or fignut, and in Yoruba land it is commonly known as “Lapalapa”\(^10\). The leaf decoction of *Jatropha gossypifolia* is used for bathing wounds.\(^11\) It was reported that the leaf bath used for sores, sprains, rash and bewitchment in Latin America and the Caribbean; the poultices are used for sores and pain in Trinidad.\(^12,13\) The stem sap stops bleeding and itching of cuts and scratches. In Southern Nigeria, the extract from fresh leaf applied with crushed leaf is routinely used by herbalists and local people to stop bleeding from the skin and nose. The coagulant activity of the leaf extract of *Jatropha gossypifolia* was detected while trying to examine its coagulant properties; hence the aim of our present study is to investigate the presence of invaluable chemicals in *Jatropha gossypifolia* species leaf part and its antipyretic and purgative activities.
MATERIALS AND METHODS

Collection of plant material
Leaves of Jatropha gossypifolia were collected in the month of October from Virudhunagar district village area and the above plant material was cleaned, dried in shadow and then it was powdered and stored at room temperature.

Animals used
Wistar Alubino rats (150-180mgs) were selected for these studies. Six rats were taken for each group. The rats were used after an acclimatization period of 7 days to a laboratory environment. They were provided with food and water.

Preparation of plant extract
The coarsely powdered leaf drug of Jatropha gossypifolia about 6g was extracted with ethanol by continuous extraction method for 48 h using soxhlet apparatus. The extract was filtered and concentrated to a dry mass by using oven. A greenish black colour residue was obtained.

PRELIMINARY PHYTOCHEMICAL ANALYSIS
Qualitative phytochemical analysis of the crude powder of the leaves collected was determined according to the standard procedures to identify the constituents as described by 14-17 Foam test for saponins. Salkowski and Liebermann-Burchard test for terpenoids and triterpenoids, FeCl₃ test for tannins. Keller-Killiani test for cardiac glycosides, Fehliing’s test for reducing sugars, and ammonia test for detection of flavonoids were performed to identify the constituents present in the extracts of the leaves of the plants.

Test for reducing sugars (Fehling’s test)
The aqueous ethanol extract (0.5g in 5ml of water) was added to boiling Fehling’s solution (A and B) in a test tube. The solution was observed for a colour reaction.
Test for terpenoids
To 0.5g of each of the extract was added 2ml of chloroform, Concentrated H₂SO₄ (3ml) was carefully added to form a layer. A reddish brown colouration of the interface indicates the presence of terpenoids.

Test for flavonoids
Three methods were used for flavonoids. First, dilute ammonia (5ml) was added to a portion of an aqueous filtrate of the extract. Concentrated sulphuric acid (1ml) was added. A yellow colouration that disappear on standing indicates the presence of flavonoids.

Test for saponins
To 0.5g of extract was added 5ml of distilled water in a test tube. The solution was shaken vigourosly and observed for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigourously after which it was observed for the formation of an emulsion.

Test for tannins
About 0.5g of the extract was boiled in 10ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added and observed for brownish green or a blue-black colouration.

Test for alkaloids
0.5g of extract was diluted to 10ml with acid alcohol, boiled and filtered. To 5ml of the filtrate was added 2ml of dilute ammonia. 5ml of chloroform was added and shaken gently to extract the alkaloidal base. The chloroform layer was regarded as positive for the presence of alkaloids.

Test for cardiac glycosides (keller-killiani test)
To 0.5g of extract diluted to 5ml in water was added 2ml of glacial acetic acid containing one drop of ferric chloride solution. This was underplayed with 1ml of concentrated sulphuric acid. A brown ring at the interface indicated the presence of a deoxysugar characteristic of cardenolides. A violet ring may appear below the brown ring, while in the acetic acid layer a greenish ring may form just above the brown ring and gradually spread throughout this layer.

ANTIPYRETIC STUDIES
Antipyretic activity was carried out according to the previously reported methods. Briefly, pyredia was induced in rats by injecting 20% (w/v) aqueous suspension of brewers yeast.
intramuscularly. After 18h, the animals developed 0.5°C or more rise in the rectal temperature (about 30% of the total number of animals injected). They were distributed into different groups of 6 each and dry residue in the doses of 100, 250 and 500 mg/kg administered orally one group.

They were distributed into 4 groups of 6 animals each. First group served as control and was given 0.5ml normal saline.

The second group served as the standard group and was administered with paracetamol (33 mg/kg) orally. 3rd and 4th groups were treated with ethanolic and acetone extracts of *Jatropha gossypifolia* at 400 mg/kg orally respectively.

At different time intervals rectal temperature was noted. Percentage reduction in rectal temperature was calculated by considering the total fall in temperature to normal level.

**PURGATIVE STUDIES**

Twenty four albino rats of either sex (120-150g) were randomly divided into five groups of four animals per group. They were starved for 24 h before the commencement of the experiment but had free access of water. The first group received 5ml/kg of distilled water, the second group received 500ml/kg of sodium pico sulphate, the third, fourth groups were given 400mg/kg of the ethanolic, acetone extract of *Jatropha gossypifolia* and the fifth, sixth groups were given 400mg/kg. All the administration were by oral route. They were then allowed free access to the standard diet.

Following the administration of the substances the animals were housed singly in cages lined with sheets of white absorbent paper. Water supply was withdrawn and the rats were observed for 24 h during which the grams of wet dropping were noted.

**RESULTS AND DISCUSSION**

Plant extracts are used to treat numerous human diseases and have prominent effect on the animal system, important therapeutic properties. Plants can function as sources of anti-cancer agents. Results reveal leaves of *Jatropha gossypifolia* have quite a number of chemical constituents, which may be responsible for many pharmacological activities.

**Phytochemical Studies**

The major phytochemicals of interest are alkaloids, tannins, flavonoids, phenolic compounds, steroidal sapogenins (saponins), however, other diverse groups of naturally occurring
phytochemicals such as unsaturated sterols, triterpenoids, essential oils are also present. These phytochemicals play important role in herbivore deterrence due to astringency or they may act as phytoalexins, killing bacteria that the plant recognizes as a threat. All the tested phytochemicals were found to be present in dried plant material (leaves). The presence of flavonoids and tannins in the leaves is likely to be responsible for the free radical scavenging activity. Flavonoids and tannins are phenolic compounds and plant phenolics are a major group of compounds that act as primary antioxidants or free radical scavengers. The results are given in the table-1. These findings give credence to the traditional medicinal application of the leaves as remedies for sores, rash and bewitchment, internal and external wounds and infections. Flavonoids have been referred to as nature’s biological response modifiers because of strong experimental evidence of their ability to modify the body’s reaction to allergies virus and carcinogens.

Table:1 Qualitative Phytochemical Screening of ethanolic extract of *Jatropha gossypifolia* Leaves

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Test</th>
<th>Presence/Absence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Terpenids (Salkowskitest)</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Reducingsugars(Fehling’s test)</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>Saponin (Foam test)</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Flavonoid (Ammonia test)</td>
<td>+</td>
</tr>
<tr>
<td>5</td>
<td>Tannin (FeCl₃ test)</td>
<td>+</td>
</tr>
<tr>
<td>6</td>
<td>Cardiac glycosides (Keller- Killani test)</td>
<td>+</td>
</tr>
<tr>
<td>7</td>
<td>Alkaloid</td>
<td>-</td>
</tr>
</tbody>
</table>

+ indicates the presence of the constituent; - indicates the presence of the constituent.

Antipyretic Studies
The results of effect of ethanolic and acetone extracts of *Jatropha gossypifolia* on yeast induced pyrexia in rats are discussed below. Control group rats (without drug treatment) did not show any significant degrees in the body temperature.

Ethanolic extract of *Jatropha gossypifolia* at 400 mg/kg showed significant total reduction in body temperature of 0.6°C compared to paracetamol 0.55°C, acetone extract of *jatropha gossypifolia* at 400 mg/kg showed total reduction in body temperature of 0.27°C respectively and proved their antipyretic action.

Treatment with paracetamol (33 mg/kg) showed significant reduced rectal temperature. Similarly ethanolic extract of *Jatropha gossypifolia* at 400 mg/kg showed significant antipyretic activity, whereas the other extracts showed a mild antipyretic activity.
The antipyretic activity of *Jatropha gossypifolia* is may be due to the presence of phytoconstituents such as tannins, alkaloids, cardiac glycosides, flavonoid, steroids, terpenoids and phenolic compounds.

The mechanism of antipyretic activity may be due to the action of one or more phyto constituents on the hypothalamous of the brain.

**Purgative Studies**

Results of purgative studies of the ethanolic and acetone extracts of Jatropha Gossypifolia are discussed as below. The results are listed in table-2

**Table-2 Purgative activity of ethanolic (1) and acetone (2) extracts of Jatropha Gossypifolia**

<table>
<thead>
<tr>
<th>Group</th>
<th>Body Weight (gm)</th>
<th>Drug and Dose</th>
<th>Faeces output (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>0-8 Hrs</td>
</tr>
<tr>
<td>1</td>
<td>H-160 B-170 T-190 C-210</td>
<td>Normal saline (5mg/kg. P.o)</td>
<td>0.74</td>
</tr>
<tr>
<td>2</td>
<td>H-210 B-225 T-200 C-180</td>
<td>Sodium Pico Sulphate (5mg/kg p.o)</td>
<td>5.01</td>
</tr>
<tr>
<td>3</td>
<td>H-210 B-230 T-195 C-190</td>
<td>1 (400mg/kg p.o)</td>
<td>0.81</td>
</tr>
<tr>
<td>4</td>
<td>H-150 B-170 T-190 C-190</td>
<td>2 (400mg/kg p.o)</td>
<td>2.80</td>
</tr>
</tbody>
</table>

**Effect of purgation**

Results were expressed as mean ± standard error of mean. The significance of difference between means of control and treated groups was determind by student’s t-test and results were regarded as significant with mean.

The extract dose-dependently produced purgation as measured by average number of faeces for 24 h in rats. The induction of purgation was significant at a dose of 400 mg/kg of acetone
extract of *Jatropha gossypifolia*, which is very similar to that of sodium pico sulphate (5mg/kg) and ethanol extract of *Jatropha gossypifolia* shows less significant activity.

The exact chemical principle responsible for the observed purgative activity is not known but may be attributed to one of the several bioactive components which we demonstrate their presence in the leaf. Although tannins and glycosides have been present in the plant may not have any contractile effect it is also possible that the purgative activity is mediated by the interaction of more than one secondary metabolites. The purgative activity of acetone extract of *Jatropha gossypifolia* was significant and ethanol extract of *Jatropha gossypifolia* was less significant.

**CONCLUSION**

The phytochemical screening of ethanolic extract of *Jatropha gossypifolia* leaves showed the presence secondary metabolites such as Saponin, Tannins, Phenols, Steroids, Glycosides, Flavonoids etc., The present study also highlights the significant antipyretic activity of ethanolic extract of *Jatropha gossypifolia* leaves where as the acetone extract shows less significant antipyretic activity, where as the purgative studies revealed that the acetone extract shows good purgative activity when compared to ethanolic extract of *Jatropha gossypifolia*. So the present study confirms the presence of valuable chemicals in *Jatropha gossypifolia* leaves and highlights the real potential of *Jatropha gossypifolia* leaves extracts in the preparation of versatile antipyretic and purgative drugs in future.

**REFERANCE**