Phytochemical and pharmacological evaluation of leaves of *Abutilon indicum*

Lakshmayya*, Narasimha Rao Nelluri, Pramod Kumar, Nanda Kishor Agarwal, T Shivaraj Gouda and S Ramachandra Setty

V.L. College of Pharmacy, Raichur 584 103

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The leaves of *Abutilon indicum* Linn. were traditionally used to treat bronchitis, gonorrhoea, and as mouthwash in toothache, etc. However local practitioners have claimed that the leaves are highly useful in controlling diabetes mellitus. Hence the present study was planned to verify this claim and also to screen for the analgesic property. In addition, an attempt was made to identify the class of phytochemicals present in the leaves and also attribute the pharmacological property of the leaves to the particular type of phytochemicals. The results revealed that the leaves contain steroids, sapogenins, carbohydrates and flavonoids. It was also observed that different extracts have shown significant hypoglycaemic activity at 400 mg/kg dose, but aqueous extract was most potent in reducing the blood glucose levels. Similarly pet. ether extract and benzene extract were found to possess very good analgesic property. In addition all the extracts have shown CNS depressant activity. The results revealed that the use of leaves in controlling diabetes mellitus is justifiable. However present study failed to attribute this property to any class of the phytoconstituent present in the leaves.

**Keywords:** *Abutilon indicum* Linn., Diabetes mellitus, Traditional medicine

Traditionally various parts of the plant *Abutilon indicum* Linn. have been used in treating various human ailments. The roots are useful in treating uterine haemorrhagic discharges. Similarly, seeds are used in the treatment of bronchitis, gonorrhoea and piles. Leaves are useful in toothache, lumbago, piles and all kinds of inflammation. Bark is used as anthelmentic, diuretic and alexeteric.

Literature review indicates that *A. indicum* possesses antifertility activity and analgesic activity. There are reports that aerial parts of the plant contain β-sitosterol, gossypetin-8- and -7-glucosides, cyanidin-3-rutinoside, tocopherol oil (0.3%) and flavonoids, while seeds contain fatty acids like linoleic, palmitic, oleic and stearic acids.

In addition it is reported that the plant also possesses antispasmodic, cardiac depressant, estrogenic, antifungal and hepatoprotective properties. But, there is no information regarding the phytocontents of the leaves and also the use of leaves in controlling diabetes mellitus. However, a local practitioner (Name – Venkatesh Teerth Swamy: Place
Hospet, Dist. Bellary, Karnataka) has claimed that chewing of few (4 -5) leaves in the early hours of the day is highly useful in controlling this chronic disease. Hence the present study was planned to identify the class of phytoconstituents present in the leaves and also to verify the claims of the local practitioner.

Materials and Methods
The leaves were collected from the reserved forest of suburban areas of Raichur in the months of July/August and were identified by Prof. Srivasta, Head, Dept. Of Botany, L.V.D. College, Raichur. The leaves were shade dried and powdered.

Preparation of extracts
The powdered leaves were subjected to successive solvent extraction as described by Kokate, using solvents in the increasing order of their polarity (pet. ether, benzene, ethyl alcohol and water).

The extracts were then subjected to preliminary qualitative tests to identify the phytoconstituents present in the leaves. It was observed that the pet. ether and benzene extracts contained steroids whereas alcoholic and aqueous extracts contained steroidal saponins, flavonoids and carbohydrates.

Housing and handling of animals
All the animals were housed in air-conditioned animal house of the institution and were handled in conformation with the ethical guidelines. Prior permission from the institutional ethical committee was obtained as per prescribed guidelines.

Blind screening
All the extracts were subjected to blind screening studies in mice. Albino mice of either sex were fasted for 18 hours prior to the experiment and divided into 20 groups of 6 animals each. First 5 groups received pet. ether extract 100, 200, 400, 600 and 800 mg/kg orally, respectively. Similarly groups 6-10, groups 11-15 and groups 16-20 were given benzene extract, alcoholic extract and aqueous extract at 100, 200, 400, 600, 800 mg/kg dose levels, respectively. The animals were observed for behavioral, neurological and autonomic profiles for 24 hrs, at regular intervals, and observations were continued for 7 days for delayed effect. The animals were placed on Photoactometer for assessing the effect of the extracts on CNS.

Analgesic activity
All the extracts were screened for analgesic activity by using radiant heat analgesiometer. Overnight fasted albino rats of either sex were divided into 4 groups of 6 animals each. Animals of these groups received pet. ether, benzene, alcoholic, and aqueous extract 400 mg/kg orally, respectively. The reaction time of the animal was noted at regular intervals. The results are compiled in Table 1.

Hypoglycaemic activity
Albino rats of either sex weighing between 170-200 gm were divided into 5 groups of 6 animals in each group and fasted for 18 hrs before commencing the experiment. During this period water was given ad libitum. Animals of Group 1-4 received pet. ether, benzene, alcoholic
Table 1—Analgesic activity of various extracts of leaves of *Abutilon indicum*

<table>
<thead>
<tr>
<th>Gr. No.</th>
<th>Drug given (400 mg/kg)</th>
<th>Reaction time in seconds at different time intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 hr</td>
</tr>
<tr>
<td>01</td>
<td>Pet. ether extract</td>
<td>9.2±0.58</td>
</tr>
<tr>
<td>02</td>
<td>Benzene extract</td>
<td>9.0±0.70</td>
</tr>
<tr>
<td>03</td>
<td>Alcoholic extract</td>
<td>7.6±1.16</td>
</tr>
<tr>
<td>04</td>
<td>Aqueous extract</td>
<td>8.2±1.28</td>
</tr>
</tbody>
</table>

*Statistically significant at 0.05 level

Table 2—Hypoglycaemic activity of various extracts of leaves of *Abutilon indicum*

<table>
<thead>
<tr>
<th>Gr. No.</th>
<th>Drug given (400 mg/kg)</th>
<th>% blood glucose reduction at regular intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0 hr</td>
</tr>
<tr>
<td>01</td>
<td>Pet. ether extract</td>
<td>---</td>
</tr>
<tr>
<td>02</td>
<td>Benzene extract</td>
<td>---</td>
</tr>
<tr>
<td>03</td>
<td>Alcoholic extract</td>
<td>---</td>
</tr>
<tr>
<td>04</td>
<td>Aqueous extract</td>
<td>---</td>
</tr>
<tr>
<td>05</td>
<td>Tolbutamide 40 mg/kg</td>
<td>---</td>
</tr>
</tbody>
</table>

*Statistically significant at 0.05 level

and aqueous extracts 400 mg/kg, respectively and group 5 received tolbutamide 40 mg/kg orally. The blood samples were collected from the tail vein at 0, 1, 2, 4, 6, 8 and 12 hrs, and were analysed for blood glucose level by GOD/POD method. The results are shown in Table 2 and Fig.1.

**Results**

Blind screening studies (reduction in the score in Photoactometer and grooming) revealed that pet. ether and benzene extracts possess dose dependent CNS depressant property. None of them could elicit narcosis (though no specific test for assessing narcosis was adopted, an indirect observation that none of the extracts could produce Straub's tail in mice; this indicated that the leaves may not produce narcosis) or mortality up to 800 mg/kg dose. Pet. ether and benzene extracts produced significant activity at 400 mg/kg dose and hence this was selected for further study.

Pet. ether and benzene extracts at 400 mg/kg dose have shown very good analgesic activity without causing narcosis. Pet. ether, benzene, alcoholic and aqueous extracts reduced blood glucose levels to the extent of 34.68%, 46.336, 30.304 and 53.55%, respectively.
and the activity was comparable to that of tobutamide 40 mg/kg.

**Statistical analysis**

The results of the analgesic and hypoglacaemic activity were subjected to Students' t test. When the calculated P-values were less than 0.05, the effects of the extracts were considered to be statistically significant.

**Discussion**

Preliminary phytochemical tests demonstrated the presence of steroids in pet. ether and benzene extracts which were found to induce dose dependant CNS depression. Pet. ether extract was found to be most potent in doing so. Hence, the CNS depressant activity of these extracts may be attributed to the steroidal component of the plant. Similarly, these extracts have also demonstrated very good analgesic property, whereas other extracts containing flavonoids and carbohydrates failed to show analgesic property. Therefore this property may also be attributed to steroidal constituents of the plant. Since all the extracts of the leaves are found to possess hypoglycaemic activity, it is difficult to attribute this activity to any one of the constituents. But the present study justifies the claim of the local practitioner that the leaves of *Abutilon indicum* are useful in controlling diabetes mellitus. Further studies are being undertaken to isolate and characterise various phytoconstituents and also to establish the influence of the extracts in diabetic animals. In addition, it
is also planned to study the effects following bolus and chronic administration of these extracts.

References
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