EFFECT OF DATURA METEL (DHATURA) SEEDS IN EXPERIMENTALLY INDUCED DIARRHOEA

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ABSTRACT

To evaluate the anti-diarrhoeal activity of methanolic extract of seeds of Datura metel on experimental-induced diarrhoea. Anti-diarrhoeal activity of seeds of Datura metel at the doses of 100 mg/kg and 200 mg/kg was evaluated using castor oil induced diarrhoea model in rats, magnesium sulphate induced diarrhoea model in rats and gastrointestinal motility by charcoal meal in mice. Preliminary phytochemical analysis of methanolic extract of seeds of Datura metel showed the presence of steroids, tannins, flavonoids and alkaloids. Methanolic extract of seeds of Datura metel at the doses of 100 and 200 mg/kg significantly delayed the onset time of first defecation, decreased the number and weight of faeces as compared to control group. The mean distance travelled by charcoal meal showed a significant reduction in the movement of charcoal. These results suggest that anti-diarrhoeal activity of methanolic extract of seeds of Datura metel may be due to its anti-secretory and antimotility effect. These effects may be due to the presence of different phytochemicals and could be used for the treatment of diarrhoea.

Keywords: Diarrhoea, Datura metel, Antimotility

INTRODUCTION

Diarrhoea is the most common gastrointestinal disorder in clinical practice1. Diarrhoea occurs when the intestinal contents rapidly transit through the small intestine, enzymatic digestion of foodstuffs and absorption of fluid and nutrients decreased or secretion of the fluid into the GIT tract increased2. Diarrhoea caused by infection with bacterial, fungal and viral agents. Diarrhoea also caused by medications such as antibiotics3. Diarrhoeal disease is leading cause of morbidity worldwide and represents a leading cause of childhood death in the developing world4.

There are available various drug treatments for diarrhoea, examples are loperamide, bismuth subsalicylate, Diphenoxylate and many other drugs, but these drugs have side effects like abdominal discomfort, dry mouth, nausea, constipation5. Therefore, herbal therapies should be considered because herbal plants have natural origin and possess lesser side effects than the conventional drugs and thus are safer to use. It should be necessary and important to identify and evaluate commonly available natural or herbal drugs as a better alternative for the treatment of diarrhoea.

Datura metel Linn. or Datura albo6 is a perennial herbaceous plant, belonging to family Solanaceae. The name Datura comes from the early Sanskrit Dhustura7. It is commonly known as datura in Hindi, White Thorn Apple in English. The seeds contain alkaloids, tannins, cardiac glycosides, flavonoids and carbohydrates8. Traditionally, seeds of Datura metel are used to treat skin rashes, ulcers, bronchitis, jaundice and diabetes. The plant Datura metel Linn is distributed through India in waste place and along road sides and widely cultivated and naturalized in tropic. It is native to Asia and Africa9. Anti-diabetic10, anti-fertility11, insecticidal12 activities of Datura metel seeds extract are reported in literature. Traditionally, Datura metel seeds have anti-diarrhoeal effect13 but it has not been scientifically proved. Hence, we investigated the anti-diarrhoeal activity of Datura metel seeds extract against in-vivo animal models using experimental rats.

MATERIALS AND METHODS

Procurement of plant material

Seeds of Datura metel was procured from Shekhawati herbs, churu, Rajasthan and authenticated by Dr. H.B. Singh, Chief Scientist & Raw Materials Herbarium & Museum, National Institute of Science Communication and Information Resources (NISCAIR), New Delhi, India. A voucher specimen has been deposited at the NISCAIR Herbarium (NISCAIR/RHMD/ Consult/2002-13/2171/181 dated January 01, 2013).

Preparation of seed extract

Extraction was done with soxhlet apparatus using 89g of powdered Datura metel seeds. Firstly, Datura metel seeds extracted with petroleum ether to remove fatty materials, and then the marc obtained was again extracted with methanol. The solvent was completely removed under reduced pressure till the semi solid mass was obtained. A dark reddish-brown semi solid extract was obtained with a yield of 3.5%. The extract was stored in desiccator and a weighed amount was suspended in distilled water using 1% gum acacia as suspending agent prior to administration. The extract was administered orally at doses of 100 and 200 mg/kg. The doses were selected based on previous acute oral toxicity study.

Phytochemical testing

Preliminary phytochemical screening of methanolic extract of Datura metel seeds was done to test the presence of the active chemical constituents such as flavonoids, tannins, saponins, alkaloids and phenolic compounds14.
**Castor oil induced diarrhoea model**

This method, described by Shoba and Thomas (2001)\textsuperscript{15}, rats fasted for 18hrs were randomly allocated to four groups of five animals in each group. Group I received 1% gum acacia p.o. at a dose of 5ml/kg BW. Group II received standard anti-diarrhoal drug loperamide at a dose of 3mg/kg p.o. Group III and IV received the methanolic extract of *Datura metel* seeds at the doses of 100mg/kg and 200mg/kg orally. After a pre-treatment period of 45 min, activated charcoal (10%) suspended in gum acacia (0.6%) was administered to all the mice at the dose of 25ml/kg orally. After 15 min of charcoal administration, all the mice were sacrificed with overdose of anaesthetic ether. The intestinal part from pyloric sphincter to caecum was removed and total length was measured in cm. The distance travelled by charcoal was measured in cm and expressed as the percent of the total length of the intestine. Percentage of inhibition was calculated by following the formula\textsuperscript{16}.

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**Magnesium sulphate induced diarrhoea model**

Animals and treatment was similar to castor oil induced diarrhoea model. After 60 min of drug treatment, the animal in each group received magnesium sulphate (2g/kg) orally, but diarrhoea was not induced in control group, so the dose of magnesium sulphate increased to 4g/kg ariarithematically and again failed to induce diarrhoea. Then dose was increased to 8g/kg and it induced diarrhoea and again the following parameters were observed for 4 hr: consistency of diarrhoea, number of faeces, and weight of faecal output for 4 hr. Anti-diarrhoal activity was determined in terms of percentage of protection of faecal matter, which was calculated by following formula\textsuperscript{16}.

**Gastrointestinal motility by charcoal meal**

The method of Yegnarayanan and Shrotri (1982)\textsuperscript{17} was used. Mice were divided in to four groups, and each group consists of five animals. Group I received 5ml/kg of vehicle (1% gum acacia) p.o. and served as control group. Group II received atropine (5ml/kg of vehicle (1% gum acacia)) p.o. and served as control group. Group I received 5ml/kg i.p. and served as control group. Group II received loperamide at a dose of 3mg/kg p.o. Group III and IV received 1% gum acacia p.o. at a dose of 5ml/kg BW. Group II received standard anti-diarrheal drug loperamide at a dose of 3mg/kg p.o. Group III and IV received the methanolic extract of *Datura metel* seeds at the doses of 100mg/kg and 200mg/kg orally. After a pre-treatment period of 45 min, activated charcoal (10%) suspended in gum acacia (0.6%) was administered to all the mice at the dose of 25ml/kg orally. After 15 min of charcoal administration, all the mice were sacrificed with overdose of anaesthetic ether. The intestinal part from pyloric sphincter to caecum was removed and total length was measured in cm. The distance travelled by charcoal was measured in cm and expressed as the percent of the total length of the intestine. Percentage of inhibition was calculated by following the formula\textsuperscript{16}.

**RESULTS**

**Phytochemical analysis**

Preliminary phytochemical screening of methanolic extract of seeds of *Datura metel* has shown the presence of various active constituents like alkaloids, tropane alkaloids, flavonoids, tannins, steroids.

**Castor oil induced diarrhoea**

In the castor oil induced diarrhoeal method, the methanolic extract of seeds of *Datura metel* at the doses of 100mg/kg and 200mg/kg produced a marked anti diarrhoeal effect in the rats, as shown in table 1.

**Magnesium sulphate induced diarrhoea**

In the magnesium sulphate induced diarrhoeal method, the methanolic extract of seeds of *Datura metel* at the doses of 100mg/kg and 200mg/kg produced a marked anti diarrhoeal effect in the rats, as shown in table 2.

**Gastrointestinal motility by charcoal meal**

The methanolic extract of *Datura metel* at the doses of 100mg/kg and 200g/kg decreased significantly the propulsion of charcoal through the gastrointestinal tract when compared with control group as shown in table 3.

**Table 1: Effect of methanolic extract of *Datura metel* seeds on castor oil induced diarrhoea model in rats (n=5)**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment</th>
<th>Dose mg/kg</th>
<th>Onset of first defeation (min)</th>
<th>Number of feces</th>
<th>Weight of feces (gm)</th>
<th>% of protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>Vehicle</td>
<td></td>
<td>23.6±2.2</td>
<td>7.6±0.59</td>
<td>6.48±0.24</td>
<td>97.36</td>
</tr>
<tr>
<td>Group II</td>
<td>Loperamide</td>
<td>3</td>
<td>238±24.0***</td>
<td>0.2±0.2***</td>
<td>0.22±0.23***</td>
<td>97.36</td>
</tr>
<tr>
<td>Group III</td>
<td><em>Datura metel</em> seeds</td>
<td>100</td>
<td>139±18.4***</td>
<td>4.4±0.24***</td>
<td>3.4±0.16***</td>
<td>43.59</td>
</tr>
<tr>
<td>Group IV</td>
<td></td>
<td>200</td>
<td>70.4±5.30*</td>
<td>2.6±0.24***</td>
<td>1.18±0.15***</td>
<td>66.6</td>
</tr>
</tbody>
</table>

Values are presented as mean ± SEM. *P* <0.01, **P** <0.001, *NS*: Non-Significant

Group II, III, IV compared to castor oil control (group I).

**Table 2: Effect of methanolic extract of *Datura metel* seeds on magnesium sulphate induced diarrhoea model in rats (n=5)**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Treatment</th>
<th>Dose mg/kg</th>
<th>Onset of first defeation (min)</th>
<th>Number of feces</th>
<th>Weight of feces (gm)</th>
<th>% of protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>Vehicle</td>
<td></td>
<td>25.2±2.4</td>
<td>11.2±0.59</td>
<td>4.08±0.06</td>
<td>-</td>
</tr>
<tr>
<td>Group II</td>
<td>Loperamide</td>
<td>3</td>
<td>236±4.0***</td>
<td>0.6±0.06***</td>
<td>0.196±0.19***</td>
<td>94.64</td>
</tr>
<tr>
<td>Group III</td>
<td><em>Datura metel</em> seeds</td>
<td>100</td>
<td>149.6±11.03***</td>
<td>4.8±0.37***</td>
<td>2.39±0.10***</td>
<td>57</td>
</tr>
<tr>
<td>Group IV</td>
<td></td>
<td>200</td>
<td>165.6±7.11***</td>
<td>3.2±0.2***</td>
<td>1.39±0.05***</td>
<td>71</td>
</tr>
</tbody>
</table>

Values are presented as mean ± SEM. *P* <0.001, **P** <0.01, *NS*: Non-Significant

Group II, III, IV compared to magnesium sulphate control (group I).
DISCUSSION

Diarrhoea is a major cause of mortality in infants and children in developing countries[1]. The present study reported the protective effect of methanolic extract of *Datura metel* seeds on various diarrhoea induced models such as castor oil and magnesium sulphate induced diarrhoea in rats and gastrointestinal motility by charcoal meal in mice.

Castor oil induced diarrhoea by ricinoleic acid which is the main active constituent of castor oil that causes diarrhoea[8]. In this study, the methanolic extract of *Datura metel* seeds reduced castor oil induced diarrhoea which may either be due to its inhibitory action on ricinoleic acid synthesis. Magnesium sulphate induces diarrhoea by osmotic imbalance preventing reabsorption of water ions, leading to increase in the volume of the intestinal content[14]. The methanolic extract of *Datura metel* seeds may have increased the absorption of water and electrolyte from the gastrointestinal tract. Charcoal meal test in mice is a method used to study the effect of the drugs on the peristalsis movement[20]. The extract at the doses of 100 and 200mg/kg suppressed the propulsion of charcoal meal in dose dependent manner or significantly (p<0.001).

CONCLUSION

In conclusion, the results obtained in the present study suggest that *Datura metel* seed extract have beneficial effect in controlling the diarrhoea in experimental rats and mice. The anti-diarrhoeal property of *Datura metel* seeds may be due to its antisercretory and antimotility effect which may be due to the presence of different phytochemicals.

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REFERENCES


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