THERAPEUTIC VALIDATION OF CORIANDRUM SATIVUM EXTRACT IN EMESIS AND ANALGESIA

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Abstract
In the traditional system of medicine, the leaves and seeds of Coriandrum sativum are used usually as emollient, anti-inflammatory, stomach-ache, carminative, digestive, constipating, astringent, antipyretic, diuretic, appetite, stimulant, refrigerant, tonic, expectorant, in dyspepsia etc. The aim of this study was to investigate antiemetic and analgesic activity of the whole plant extract of Coriandrum sativum in Wister albino rats and chick emesis models. The antiemetic activity of the Coriandrum sativum is determined by using the chick emesis model. Antiemetic activity of Coriandrum sativum is determined by percentage inhibition of retching that is tempted with the help of copper sulfate. Copper sulphate is used to persuade emesis in chick. Analgesic activity is established by using the Wister albino rat as an experimental animal. Acetic acid is used to induce wrinkles in animals. The plant extract decreases the dose dependent writhing in acetic acid induced analgesia in Wister albino rats.

Keywords: Analgesic, Anti-emetic activity, Coriandrum sativum (Cs.), Crude extract (Cr.)

INTRODUCTION

Gastric tract disorders involve a huge type of complexed symptoms and are diagnosed as infectious. Among the Gastric disorders, diarrhea and emesis are common and have remained an international threat to human fitness (1). For the ancient times, crude herbs have been administered to cure of health issues. Now even in the advanced technology era, plants are of much importance in healing purposes (2). As herb origin drugs are composed of a large content of metabolites having the potential of pharmacological effects, that makes the plant useful as a mitigating agent to treat various disorders (3).

Coriandrum sativum widely possesses a number of therapeutic properties. The previous pharmacological studies discovered that it possessed central nervous protective activity e.g. anxiolytic, antidepressant, sedative-hypnotic, anticonvulsant, reminiscence enhancement, development of orofacial dyskinesia, neuroprotective, the Coriandrum sativum also play important role to minimize the growth of bacteria, fungi, helminthic, insecticide, it also shows the cardioprotective effect such as cardiovascular, and hypolipidemic conditions, the Coriandrum sativum also exhibit the anti-inflammatory, analgesic, antidiabetic, mutagenic, antimutagenic, anticancer, gastrointestinal, deodorizing, dermatological, diuretic, reproductive, hepatoprotective, antioxidant, detoxing and lots of other pharmacological activities. But there was no pharmacological evaluation of anti-emetic and analgesic activity of the plant of Coriandrum sativum. Therefore, it is far necessary to establish the medical basis for anti-emetic and analgesic effect of the plant of Coriandrum sativum.

Coriandrum sativum has numerous phytochemicals alike terpenoids, sterol, terpenoids alkaloids, saponin, tannins and flavonoids. Along with the nutritional aids, this is identified as medicinal component. The analysis revealed 33 components, representing 99.99% of the whole oil from the seeds of coriander. The foremost components had been linalool (55%), α-pinene (7%), 2,6-Octadien (6%), geraniol (4%), 3-Cyclohexene-1-methanol, α,4-trimethyl-(5%), hexadecenoic acid (2%), tetra decanoic acid (2%), 2-α-pinene (2%), citronellyl acetate (2%), and undecanal (1%) (4). Different parts of Coriandrum sativum plant have been reported for several health functions and biological actions. Nutrient composition of Coriander sativum has...
been reported previously. It constitutes; protein, total lipid, carbohydrate, fiber, iron, phosphorus, magnesium, potassium, sodium, zinc, vitamin C, thiamin, riboflavin, niacin, vitamin A, and vitamin D (D2 + D3), are shown in Table I (5).

Table I. Nutrient composition of Coriandrum sativum

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Nutrients</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Protein</td>
<td>21.93-12.37g</td>
</tr>
<tr>
<td>2</td>
<td>Fats</td>
<td>4.78-17.77g</td>
</tr>
<tr>
<td>3</td>
<td>Carbohydrates</td>
<td>52.10-54.99g</td>
</tr>
<tr>
<td>4</td>
<td>Fiber</td>
<td>10.40-41.9g</td>
</tr>
<tr>
<td>5</td>
<td>Calcium</td>
<td>1246-707mg</td>
</tr>
<tr>
<td>6</td>
<td>Iron</td>
<td>42.46-16.32mg</td>
</tr>
<tr>
<td>7</td>
<td>Phosphorus</td>
<td>480-409mg</td>
</tr>
<tr>
<td>8</td>
<td>Magnesium</td>
<td>330-694mg</td>
</tr>
<tr>
<td>9</td>
<td>Potassium</td>
<td>1267-4466mg</td>
</tr>
<tr>
<td>10</td>
<td>Sodium</td>
<td>35-211mg</td>
</tr>
<tr>
<td>11</td>
<td>Zinc</td>
<td>4.70-4.72mg</td>
</tr>
<tr>
<td>12</td>
<td>Vitamin C</td>
<td>21-566mg</td>
</tr>
<tr>
<td>13</td>
<td>B-complex</td>
<td>0.00-120.00ug</td>
</tr>
<tr>
<td>14</td>
<td>Vitamin A</td>
<td>IU0.0-5850</td>
</tr>
<tr>
<td>15</td>
<td>Vitamin-D</td>
<td>0.0-0.0ug</td>
</tr>
</tbody>
</table>

Coriandrum sativum has been of broad therapeutic use in a number of gut disorders, such as dysentery, flatulence, indigestion, diarrhea, dyspepsia, and as appetizer and carminative. On the other hand, plant has not been extensively deliberated to authenticate its use in gut disorders apart from a preface study, in which the aqueous-methanol extract of Coriandrum sativum fruit was shown to have a gut stimulatory activity arbitrated through acetylcholine-like mechanism and antispasmodic activity mediated through Ca++ antagonist activity.

MATERIALS AND METHODS

PLANT COLLECTION AND IDENTIFICATION

The whole plant of Coriandrum sativum was acquired from the local market of the Quetta, Balochistan, Pakistan and turned into recognized by the humble cooperation of a professional taxonomist in the University of Balochistan Quetta.

DRUGS AND CHEMICALS

Copper sulfate, acetic acid, diclofenac sodium, chlorpromazine was purchased from Merck Sereno Pakistan Quetta Balochistan

EQUIPMENTS

Clevenger-type apparatus (recommended by pharmacopeia,) An Shimazu version 6890 fuel bonded segment DB-1 fused silica capillary column (Shimazu) Merck Serono.

EXPERIMENTAL ANIMALS

Wister albino rats and chicks have been used for the test. The rats had been received from the animal residence of Dow University of Medical Sciences Karachi Pakistan. They had been kept in suitable surroundings and fasted for 24 hour before the test, only free access to water was given. The animals had been acclimatized to laboratory condition for 5 days prior to the real experiments.

PLANT EXTRACTION

The extract from the plant was prepared with hydro distillation by the help of Clevenger type apparatus. A specified quantity (200 g) of plant was added in the flask along with one liter of distilled water. After that it was heated at 120°C for 4 hours. The solvent was evaporated via rotary evaporation and
concentrated to 1 ml and extract was stored in tapped up bottles at 4°C until analysis. The experiment was repeated thrice.

**ANTIEMETIC ACTIVITY**

Antiemetic activity of *Coriandrum sativum* was decided by the usage of chick emesis model (6). To start with, chicks were allowed to comply through setting underneath massive beakers for at least 30 minutes. Each group contained 5 chicks. The animals in the control group received ordinary saline. The standard group animals obtained chlorpromazine 150 mg/kg and the check group animals were subjected to the plant extract. After 10 minutes copper sulphate was administered orally on the dose of 150 mg/kg to all corporations. Then Retches range was counted for the subsequent 10 minutes (7). The percentage inhibition of retching was calculated with the usage of formula.

\[
\text{Percentage inhibition} = \frac{(A-B)}{A} \times 100
\]

Where A is the frequency control group

B is the frequency of test group

**ANALGESIC ACTIVITY**

**ACETIC ACID INDUCED WRITHING METHOD**

The acetic acid brought on writhing method is an analgesic behavioral remark evaluation approach that demonstrates a noxious stimulation in mice. The test includes injecting 0.1% acetic acid solution intraperitoneally after which gazing the animal for unique contraction of body specially the abdominal muscles along the stretching of hind limb referred as ‘writhing’. An evaluation of writhing is counted among control, standard (Diclofenac sodium) and test (plant extract) groups given orally 30 minutes previous to acetic acid injection. If the sample possesses analgesic activity, the animal that received the pattern will supply lower wide variety of writhing than the control, i.e. The pattern having analgesic activity will inhibit writhing. Diclofenac sodium was used as standard drug (6). Wister albino rats (n=6 in each group) weighing from 18-22 grams were used. Group 1 animals were subjected to normal saline orally, group 2 animals were given trendy drug diclofenac sodium and examine group received plant extract (*Coriandrum sativum*) at the dose of 200 mg/kg and 400mg/kg with feeding needle. After a time period of 30 minutes required for the right absorption of administered substance, Acetic acid was administered intraperitoneally in animals with the dose 0.1g/kg. Then after absorption of acetic acid quantity up to 5 minutes, writhes were observed and calculated in animals as much as half-hour.

\[
\% \text{ inhibition} = \frac{(\text{No. of writhes in Control} – \text{No. of writhes in Test})}{\text{(No. of writhes in Control)}} \times 100
\]

**STATISTICAL ANALYSIS**

Data was calculated and tabulated in software Excel version (19). Data was calculated in percentage inhibition.

**RESULTS**

**ANTIEMETIC ACTIVITY**

The Anti-emetic effect of Cs.Cr was determined at a dose of 200 mg/kg compared with Chlorpromazine (Standard) at the dose of 150 mg/kg. The results showed that the percentage inhibition of retching in the standard was 85%. While in the test plant it was 55%. Table II shows the number of retching in the different groups.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Group</th>
<th>Treatment</th>
<th>Emetic agent</th>
<th>No. of retching</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control</td>
<td>Normal saline</td>
<td>Copper sulphate</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Standard</td>
<td>Chlorpromazine</td>
<td>Copper sulphate</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Test</td>
<td>Cs.Cr. (200 mg/kg)</td>
<td>Copper sulphate</td>
<td>9</td>
</tr>
</tbody>
</table>
ANALGESIC ACTIVITY

The analgesic effect of Cs.Cr was determined at dose of 200 mg/kg and 400 mg/kg and compared with Diclofenac sodium (Standard) at the dose of 1.1 mg/kg. The results showed the %age inhibition of writhing in the standard was 77.77% while in the Cs.Cr of 200 mg/kg was 44.44% and Cs.Cr of 400 mg/kg was 66.66%. Number of writhing in different groups shown in Table III.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Group</th>
<th>Treatment</th>
<th>Analgesia inducing agent</th>
<th>No. of writhing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control</td>
<td>Normal saline</td>
<td>Acetic Acid</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Standard</td>
<td>Diclofenac sod.</td>
<td>Acetic Acid</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Test</td>
<td>Cs.Cr. (200 mg/kg)</td>
<td>Acetic Acid</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Test</td>
<td>Cs.Cr. (400 mg/kg)</td>
<td>Acetic Acid</td>
<td>3</td>
</tr>
</tbody>
</table>

DISCUSSION

Many therapeutic potential activities of Coriandrum sativum e.g., central nervous system effect, anti-diabetic activity, gastroprotective effects, hepatoprotective effects, anti-oxidant, and anti-helminthic effect has been reported in many studies. One of the previous studies discussed almost all the functional aspects of the Coriandrum sativum “a review of the chemical constituent and pharmacological activities of Coriandrum sativum” (8). Natural products have a significant role in the manufacturing of medicinal agents and medicine throughout the world as an effective way for the management of health (9). Hence the traditional herbal agent has been effectively validated for the discovery of new medicine to treat the diseases of gastrointestinal, circulatory, cardiac, respiratory ailments (10). The result of the present study signified that the whole plant extract of Coriandrum sativum has analgesic and anti-emetic activities were comparable with standard diclofenac and chlorpromazine respectively. Because the whole plant of the Coriandrum sativum are mostly used in cooking and as vegetable all over the world and no pharmacological effect have been yet reported. Acetic acid-prompted writhing test turned into selected to check upon the peripheral analgesic interest of the extract. Because of its sensitivity and potential to stumble on antinoceptive results of natural products and test compounds at dose stages which remains inactive for different strategies, acetic acid-induced writhing (11). The test is a well-recommended model for screening the peripheral analgesic potentials of taking a look at compounds (12). Intraperitoneal injection of acetic acid reasons inflammation and stimulation of the peritoneal hollow space that triggers the synthesis and release of diverse endogenous inflammatory mediators such as histamine, serotonin, bradykinin substance P, and Prostaglandins (PGs) (12). These numerous endogenous inflammatory mediators elicited chemical-brought on visceral ache which is characterized by way of constriction of abdominal muscular tissues collectively with the extension of the forelimbs and elongation of the body. That is why the acetic acid-induced writhing test is taken into consideration as a version of visceral ache. This model has also been associated with multiplied level of PGE and PGF2. Increasing PG degrees in the peritoneal hollow space complements inflammatory ache by means of growing capillary permeability and activating primary Coriandrum sativum extract in any respective doses (200 and 400 mg/kg) showed peripheral analgesic activities by means of lowering the range of writhing with the respective values 44.44% and 66.66% These findings confirmed that the peripheral analgesic pastime of the extract accelerated from the lower dose (200 mg/kg) to the higher dose (400 mg/kg) in dose established manner. The increase in analgesic activity with increasing doses of the extract might be attributed with awareness of phytocconstituents (saponins, tannins and alkaloids) that own analgesic activity with the most dose. The possible mechanism by means of which the extract produced peripheral analgesia in this model is probably related to inhibiting the synthesis and release of various endogenous inflammatory mediators and suppression of sensitivity of peripheral nociceptors inside the peritoneal unfasted nerve endings for chemical-caused pain. These proposed mechanisms are in keeping with the concepts that stated, any agent that decreases the variety of writhing will display analgesia through inhibiting the synthesis and release of PGs, and by inhibiting the peripheral pain transmission (13).
The anti-emetic activity of plant extracts of *Coriandrum sativum* showed that these extracts have an anti-emetic effect in young chicks. Extracts notably on the dose of 200mg/kg suppressed the frequency of copper sulfate-precipitated retching. Therefore, from the consequences, it's far clear that those extracts has protective consequences against copper sulfate-triggered retching in younger chicks, probable with the aid of peripheral signal because the oral copper sulfate induces emesis via peripheral action through excitation of visceral afferent nerve fibers of the GIT (14). It has additionally been established that the peripheral 5-HT4 plays a crucial role in copper sulfate bringing about emesis. Although the consequences are extensive and comparable with regard drug chlorpromazine however the mode of action and accountable compounds aren't recognized. However, flavonoids are mentioned to own anti-emetic activity (15). So, the antiemetic effect can be due to the presence of these flavonoids. Therefore, those outcomes want to be verified in other experimental fashions, and the compound(s) related hobby is needed to in addition specify the responsible anti-emetichpharmacologicals. So, our study validated the anti-emetic and analgesic activity of whole plant extract. In analgesic activity the plant extract show percentage inhibition of writhing at the 200mg/kg and 400mg/kg, the plant extract at 400mg/kg shows maximum effect comparable with standard drug hence it is proved that the plant extract at 400mg/kg has significant analgesic effect. The antiemetic activity was determined at 200mg/kg of the plant extract only the plant extract show the substantial amount of reduction in the percentage inhibition of the retching’s.

*Coriandrum sativum* has been validated for its traditional use to treat multiple ailments of diverse etiology and the study was undertaken to validate its potential therapeutic effects in gastrointestinal tract and in analgesia, the research established the data that the *Coriandrum sativum* increases percentage inhibition of writhes and retching in animals’ model so our study established the antiemetic and analgesic activity of the whole plant extract (16).

**CONCLUSION**

The plant extract of *Coriandrum sativum* showed antiemetic and analgesic activity in animal version through reducing range of moist feces, percentage inhibition of emesis and writhing. Although the experimental anti-emetic and analgesic models are not whole predictors of the medical effectiveness of the extract, the overall findings from this have a look at indications on antiemetic and analgesic capacity of plant extract of *Coriandrum sativum*.

**Conflict of Interest:**

Authors declare that they have no conflict of interest.

**Acknowledgement:**

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**References:**