ORIGINAL ARTICLE

ANTIDIARRHOEAL EVALUATION OF AQUEOUS EXTRACTS OF GARCINIA INDICA & CUMINUM CYMINUM AND A POLYHERBAL FORMULATION

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ABSTRACT

Objective: The objective of the study was to assess and verify the traditional claims of use of Garcinia indica and Cuminum cyminum in diarrhoea. One of the marketed herbal tablet was also assessed for its antidiarrhoeal activity.

Methods: In the present study, the aqueous extracts of G. indica, C. cyminum and Bi-Quinol tablets were evaluated in vivo in mice by castor oil-induced diarrhoea method.

Results: Both G. indica and C. cyminum at doses of 200 mg/kg and 400 mg/kg significantly reduced the total number of faeces (P<0.001) as well as diarrhoeic faeces (P<0.05 and P<0.01) in a dose-dependent manner when compared with the control. Bi-Quinol tablets at the dose of 100 mg/kg reduced the total number of faeces (P<0.001) as well as diarrhoeic faeces (P<0.01) when compared with the control. The reduction in total number of faeces was greater in C. cyminum as compared to G. indica at both the doses tested. The percent protection with respect to total number of wet faeces against diarrhoea was found to be 87.5 for Loperamide, 66.67 and 62.5 for G. indica (400 mg/kg) and C. cyminum (400 mg/kg) respectively and 70.83 for Bi-Quinol (100 mg/kg). At lower doses of 200 mg/kg, G. indica and C. cyminum showed 54.17% and 45.83% percent protection respectively. The plants and the Bi-Quinol tablets extracts showed the presence of alkaloids, carbohydrates, flavonoids, phenols, tannins, phytosterols and saponins. The results were found to be statistically significant with P value set at 95% confidence interval.

Conclusion: The results obtained showed that G. indica, C. cyminum and the Bi-Quinol tablets decreased the number of wet faeces as well as the total number of faeces. It was concluded that the extracts might have exerted antidiarrhoeal activity through the anti-hypersecretory mechanism. A decrease in contractility of the ileum (smooth muscle) may be another mechanism responsible for the protective action of the extracts against diarrhoea.

Keywords: Garcinia indica, Cuminum cyminum, Antidiarrhoeal activity.

INTRODUCTION

The World Health Organisation (WHO) statistics states that diarrhoea is the cause of 10% of all child deaths globally, under the age five [1]. Diarrhoea affects people of all ages, due to several causes - dehydration, malnutrition, infection (bacterial, viral and parasitic organisms), zinc deficiency, functional bowel disorders, food intolerances & sensitivities and reaction to medicines. Severe diarrhoea becomes life-threatening, particularly in young children and people who are malnourished or have impaired immunity. Other symptoms that accompany diarrhoea are cramping, abdominal pain, nausea and loss of bowel control [2]. Modern medication is still a challenge for a vast majority of the population in the third world countries. Traditional herbal remedies are an integral component of people's cultural beliefs and also represent a part of struggle of the countries. Traditional herbal remedies are an integral component of people's cultural beliefs and also represent a part of struggle of the countries.

MATERIALS AND METHODS

Preparation of extract

The dried rinds of G. indica fruit and dried C. cyminum seeds were procured from the local market. Both the plant parts were authenticated by Dr. Ganesh N. Iyer at Ramnarain Ruia College, Mumbai, Maharashtra. The dried rinds of kokum fruit and dried cumin seeds were coarsely powdered. A quantity of 100 gms of each of the above mentioned powders were separately refluxed in a round bottom flask for 3 hours using 400 ml distilled water. The extracts obtained were filtered. The extracts were concentrated in a rotary evaporator. The extracts were then subject to qualitative phytochemical tests for identification of phytoconstituents [13]. Samples of a marketed herbal antidiarrhoeal tablet Bi-Quinol were purchased from the local pharmacy.

Drugs

Castor oil (Ashwin Fine Chemicals and Pharmaceuticals), Loperamide hydrochloride – Cipla Pharmaceuticals Ltd, Bi-Quinol (Bhairavi Pharmaceuticals), Tween 80 (S.D. Fine Chem Ltd.)

Animals

Mus musculus “Swiss albino” mice of either sex, weighing 25–45 gm; obtained from Haffkine Institute, Mumbai, were used for the experiments. The animals were acclimatized to standard environmental conditions at 22 ± 2°C on a 12 hour light-dark cycle with free access to pellet food and water ad libitum for five days prior to the experiments. All experiments were performed after an overnight fast of 12 hours.

Ethics

The study was approved by Institutional Animal Ethical Committee of SPP School of Pharmacy & Technology Management, SVKM’s NMIMS, Vile Parle (w), Mumbai (CPCSEA/IAEC/SPTM/P-07/2014).
Dose selection

The LD_{50} cut off value reported for Garcinia indica in Wistar rats is 2000 mg/kg [14]. Cuminum cyminum at a dose of 2000 mg/kg did not cause any morbidity or mortality in rats during the 14 days of observation period [15]. Therefore, for the evaluation of antidiarrhoeal activity, two doses were selected; first was one-twelfth of the LD_{50} cut off value and second was twice that of one-twelfth dose (200 mg/kg & 400 mg/kg P.O. single dose for both the extracts). A dose of 100 mg/kg was selected for the tablet Bi-Quinol.

Antidiarrhoeal Activity

Castor oil-induced diarrhoea method

The method described by Shobha and Thomas (2001) was followed with minor modification [9, 16]. The animals were divided into control and test groups of five each. Each animal was placed in an individual cage, the floor of which was lined with blotting paper. The floor lining was changed every hour. The control group received vehicle 1% Tween 80 in water at the dose of 10 ml/kg. Thirty minutes following the administration of loperamide and test extracts, each animal was administered 0.3 ml castor oil orally. The parameters observed for a period of 4 hours were: onset time of diarrhoea, the total number of faeces as well as the number of diarrhoeic faeces excreted by the animals in 4 hours and the total weight of diarrhoeal stools in that period of time. A numerical score based on stool consistency were assigned as follows: normal stool=1, semi-solid stool=2 and watery stool=3. The onset was measured as the time interval in minutes between the administration of castor oil and the appearance of the first diarrhoeal stool (wet faeces that leave a halo on the filter paper). The percent protection against diarrhoea was calculated with respect to number of wet faeces.

Grouping of animals

Group I (Control): Vehicle Control (1% tween 80 in water, 10 ml/kg, p.o.)

Group II (GI AE 200): Garcinia indica, aqueous extract (dose: 200 mg/kg, p.o.)

Group III (GI AE 400): Garcinia indica, aqueous extract (dose: 400 mg/kg, p.o.)

Group IV (CC AE 200): Cuminum cyminum, aqueous extract (dose: 200 mg/kg, p.o.)

Group V (CC AE 400): Cuminum cyminum, aqueous extract (dose: 400 mg/kg, p.o.)

Group VI (Bi-Quinol 100): Bi-Quinol, aqueous extract (dose: 100 mg/kg, p.o.)

Group VII (Loperamide 3): Loperamide (dose: 3 mg/kg, p.o.)

Table 1: Results of phytochemical screening of the aqueous extracts of Garcinia indica and Cuminum cyminum and Bi-Quinol tablets

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Tests</th>
<th>G. indica</th>
<th>C. cyminum</th>
<th>Bi-Quinol tablets</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alkaloids</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Carbohydrates</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>Flavonoids</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Glycoside</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>5</td>
<td>Phenols</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6</td>
<td>Proteins &amp; amino acids</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Phytosterols</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>8</td>
<td>Saponins</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>9</td>
<td>Tannins</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

(+) = Present, (-) = Absent

Table 2: Evaluation of antidiarrhoeal activity of Garcinia indica and Cuminum cyminum and Bi-Quinol tablets against castor oil-induced diarrhoea

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (mg/kg)</th>
<th>Onset time of diarrhoea (mins)</th>
<th>Total number of faeces</th>
<th>Number of wet faeces</th>
<th>Total weight of wet faeces (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>10 ml/kg</td>
<td>48.4 ± 5.25</td>
<td>118 ± 0.37</td>
<td>48 ± 0.37</td>
<td>722 ± 14.79</td>
</tr>
<tr>
<td>Garcinia indica 200</td>
<td>200</td>
<td>65.4 ± 5.88**</td>
<td>6.6 ± 0.40***</td>
<td>2.2 ± 0.86*</td>
<td>568 ± 16.28***</td>
</tr>
<tr>
<td>Garcinia indica 400</td>
<td>400</td>
<td>109.8 ± 4.08***</td>
<td>6.4 ± 0.24***</td>
<td>1.6 ± 0.60**</td>
<td>438 ± 12.85***</td>
</tr>
<tr>
<td>Cuminumcyminum 200</td>
<td>200</td>
<td>75 ± 9.75**</td>
<td>8.2 ± 0.86***</td>
<td>2.6 ± 0.24*</td>
<td>584 ± 20.68***</td>
</tr>
<tr>
<td>Cuminumcyminum 400</td>
<td>400</td>
<td>88 ± 10.56**</td>
<td>6 ± 0.32***</td>
<td>1.8 ± 1.06**</td>
<td>526 ± 20.34***</td>
</tr>
<tr>
<td>Bi-Quinol 100</td>
<td>100</td>
<td>57 ± 4.64**</td>
<td>8 ± 0.98***</td>
<td>1.4 ± 0.40**</td>
<td>506 ± 4.92***</td>
</tr>
<tr>
<td>Loperamide 3</td>
<td>3</td>
<td>220.8 ± 8.07***</td>
<td>1.6 ± 0.24***</td>
<td>0.6 ± 0.60**</td>
<td>348 ± 10.23***</td>
</tr>
</tbody>
</table>

Values are expressed as Mean ± SEM, n=5. *P < 0.05, **P < 0.01, ***P < 0.001, ns=not significant when P > 0.05.
CONFLICT OF INTEREST: Nil

ACKNOWLEDGEMENTS
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REFERENCES