Estimation of Anti-Ulcer Activity of Aqueous Extracts from the Leaves of Nyctanthes Arbortristis on Albino Rats

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Abstract

Peptic ulcer disease (PUD) is one of the prevalent pathogenic conditions. Helicobacter pylori and the use of Non Steroidal Anti Inflammatory Drugs (NSAIDS) are two of the most common etiological causes in the peptic ulcer disease. Recent years have shown significant increase in NSAIDS consumption though they have side effects. To reduce some of these effects and protect gastro intestinal tract, herbal treatment can be given instead. The objective of the present study is to investigate and determine the gastro protective (anti-ulcer) activity of aqueous and hydro-alcoholic extract of leaves of Nyctanthes arbortristis in induced ulcerated rats. The extracts were studied in two dose levels (200 mg / 400 mg) in rats against Aspirin (NSAID – 500 mg/Kg body weight). Ranitidine (50mg / Kg body weight) was used as a standard drug. The therapeutic efficacy of the extracts of leaves in two doses was compared with standard. The leaf extracts has shown promising results by decreasing the aspirin induced ulcers in rat models. This shows that the leaf extracts have significant anti ulcer activity. This study can help in further studies for their anti-ulcer efficacy and in future works for the development of new formulations.

Keywords: Anti-ulcer, Nyctanthes arbortristis, Aspirin, Ranitidine, Aqueous extract

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1 Introduction

Ulcer is an open sore that develops on the inside lining of the stomach (a gastric ulcer) or the small intestine (a duodenal ulcer). Both types of ulcers are also referred to as peptic ulcers1. The most common symptom of a peptic ulcer is a burning or gnawing pain in the center of the abdomen (stomach). In the past, it was mistakenly thought that the main causes of peptic ulcers were lifestyle factors, such as diet, smoking, alcohol and stress. While these factors may play a limited role, it is now known that the leading cause of peptic ulcers is a type of bacteria called H. pylori. H. pylori can infect the stomach and small intestine; and in some people, the bacteria can irritate the inner layer of the stomach and small intestine, leading to the formation of an ulcer. Peptic ulcer occurs due to an imbalance between the aggressive (acid, pepsin and Helicobacter pylori) and the defensive (gastric mucus and bicarbonate secretion, prostaglandins, innate
resistance of the mucosal cells) factors. Painkillers known as nonsteroidal anti-inflammatory drugs (NSAIDs), which include aspirin and ibuprofen, are the second most common cause of peptic ulcers. These types of painkillers can irritate the lining of the stomach and small intestine in some people, particularly if they are taken on a long-term basis.

Number of drugs, including proton pump inhibitors, prostaglandins analogs, histamine receptor antagonists and cytoprotective agents, are available for the treatment of peptic ulcer, but most of these drugs produce several adverse reactions, including toxicities, and may even alter biochemical mechanisms of the body upon chronic usage.[9] Hence herbal medicines are generally used in such chronic cases, wherein drugs are required to be used for long periods. Hence the present work was undertaken to investigate the antiulcer activity of aqueous extract of Nyctanthes arbortristis in rats.

1.1 Nyctanthes Arboristis
Nyctanthes arbortristis is a medicinal plant. It belongs to the family Oleaceae. It is also known as Coral Jasmine, Night Jasmine, Parijata, Shefali, Harshringar and kannika. This plant is native of India, widely distributed from Sub Himalayan regions to Godavari. In ancient days Nyctanthes arbortristis is used to treat various ailments like fever, cough, malaria, bloody dysentery and gastritis. Juice of leaves of this plant is used as an antidote and reptile venom. The leaves of the plant contains D-mannitol, Flavone glycosides, Tannic acid, Ascorbic acid, Glucose, Fructose, Carotene and other important constituents. Some pharmacological activities carried on this plant revealed that it has various therapeutic activities like CNS, Antihistaminic activity, Anti-inflammatory activity, Anti-depressant activity, Immuno-modulatory activity etc. It shows significant Anti bacterial activity against Staphylococcus aureus, Staphylococcus epidermis, Salmonella typhi and Salmonella para typhi. It also exhibits Antioxidant property, Antifungal activity, anticancer property and hepato-protective activity. The study was designed to investigate the therapeutic efficacy of the aqueous and hydro-alcoholic extracts of Nyctanthes arbortristis. This research paper presents the data of anti-ulcer activity of nyctanthes arbortristis

2 Materials & Methods
The leaves of Nyctanthes arbortristis were collect from Mangalagiri, Guntur district, Andhra Pradesh, India in the morning by hand picking method in the month of December. The leaves were shade dried. The dried leaves were made into powder with the help of electrical grinder. The obtained powder was then subjected to soxhlation to get the aqueous and hydro-alcoholic extracts with water and ethanol as solvents respectively.

2.1 Phytochemical Screening
The extracts of Nyctanthes arbortristis leaves were subjected to various chemical tests in order to identify the chemical constituents. Alkaloids, Tannins, Glycosides, Carbohydrates &Flavonoids

2.2 Experimental Setup Animals
The wistar pale skinned person rodents, weighing 150 – 200 gm were chosen to decide the counter ulcer action of the concentrates of Nyctanthes arbortristis. All creatures were kept up under standard research facility conditions (Temperature 25±2°C, relative moistness 55±10% and 12 hr light: 12 hr dull cycle) before the beginning of the examination. Creatures were taken care of with standard research facility feed and ad.liberum. The examination was done after the earlier endorsement of all test conventions by the institutional creature moral board (Approval No:
3 Experimental Design
The animals were divided into 7 groups and each group consists of 6 animals.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>GROUPS</th>
<th>TREATMENT</th>
<th>ROUTE OF ADMINISTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GROUP I</td>
<td>Normal Saline</td>
<td>Oral</td>
</tr>
<tr>
<td>2</td>
<td>GROUP II</td>
<td>Aspirin 500mg/kg.Bw</td>
<td>Oral</td>
</tr>
<tr>
<td>3</td>
<td>GROUP III</td>
<td>Standard (Ranitidine 50 mg/kg.Bw)</td>
<td>Oral</td>
</tr>
<tr>
<td>4</td>
<td>GROUP IV</td>
<td>Hydro-alcoholic extract 200mg/kg.Bw</td>
<td>Oral</td>
</tr>
<tr>
<td>5</td>
<td>GROUP V</td>
<td>Aqueous extract 200mg/kg.Bw</td>
<td>Oral</td>
</tr>
<tr>
<td>6</td>
<td>GROUP VI</td>
<td>Hydro-alcoholic extract 400mg/kg.Bw</td>
<td>Oral</td>
</tr>
<tr>
<td>7</td>
<td>GROUP VII</td>
<td>Aqueous extract 400mg/kg.Bw</td>
<td>Oral</td>
</tr>
</tbody>
</table>

Method
Aspirin induced ulcer model method was selected for estimation of anti-ulcer activity. This method is also called NSAID induced ulcer model. The creatures were abstained (with free admittance to water) for a time of 24 hrs to guarantee total gastric exhausting. Ibuprofen was directed in a portion of 500 mg/kg.Bw orally to GROUPS II, III, IV, V, VI and VII. The animals were allowed to fast for 4 more hours and then were sacrificed. The stomach was dissected and the mucosa was examined under the microscope.

Parameters
Ulcer Index

\[ Ulcer \text{ Index} = \frac{\text{Total number of ulcers}}{\text{Number of ulcerated animals}} \times 100 \]

Percentage Ulcer Inhibition

\[ \text{Percentage of ulcer index} = \frac{\text{Control mean ulcer index} - \text{Test ulcer index}}{\text{Control mean ulcer index}} \times 100 \]

Percentage Protection
Percentage protection = Ulcer Index of Treated group / Ulcer Index of Control group \times 100

Shown the below are the Ulcer index scoring
1.5 – haemorrhagic
0.5 – Red Coloration
2 – Ulcer>3mm
1 – Spot ulceration
0 – Normal colored stomach
Analysis
The statistical analysis of all anti-ulcer activity values are tabulated and it is expressed as Mean ± Standard Error Mean
(SEM)

3 Results and Discussions
Table 3: The ulcer index of all the groups before treatment (pre), after treatment (post) and percentage of ulcer inhibition was given in the table

<table>
<thead>
<tr>
<th>S.NO</th>
<th>GROUP TREATMENT</th>
<th>ULCER INDEX (PRE)</th>
<th>ULCER INDEX (POST)</th>
<th>% OF ULCER INHIBITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Normal</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Control</td>
<td>21.86</td>
<td>21.86</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Standard ( Ranitidine )</td>
<td>11.20</td>
<td>5.9</td>
<td>48.76</td>
</tr>
<tr>
<td>4</td>
<td>Hydro-alcoholic extract 200mg/kg.Bw</td>
<td>17.60</td>
<td>14.18</td>
<td>19.48</td>
</tr>
<tr>
<td>5</td>
<td>Aqueous extract 200mg/kg.Bw</td>
<td>13.06</td>
<td>7.81</td>
<td>40.2</td>
</tr>
<tr>
<td>6</td>
<td>Hydro-alcoholic extract 400mg/kg.Bw</td>
<td>16.40</td>
<td>12.31</td>
<td>24.97</td>
</tr>
<tr>
<td>7</td>
<td>Aqueous extract 400mg/kg.Bw</td>
<td>12.26</td>
<td>6.88</td>
<td>43.9</td>
</tr>
</tbody>
</table>

1. Ulcer index before treatment
2. Ulcer index after treatment

http://doi.org/10.36295/ASRO.2020.231939
3. Percentage of ulcer inhibition after treatment

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>MEAN ± SEM</th>
<th>% ULCER INHIBITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>7.39</td>
<td>0</td>
</tr>
<tr>
<td>Standard</td>
<td>3.93</td>
<td>48.76</td>
</tr>
<tr>
<td>Hydro-alcoholic extract 200mg</td>
<td>7.13</td>
<td>19.48</td>
</tr>
<tr>
<td>Aqueous extract 200mg</td>
<td>4.86</td>
<td>40.2</td>
</tr>
<tr>
<td>Hydro-alcoholic extract 400mg</td>
<td>6.53</td>
<td>24.97</td>
</tr>
<tr>
<td>Aqueous extract 400mg</td>
<td>4.46</td>
<td>43.9</td>
</tr>
</tbody>
</table>

Discussion

The antiulcer property of *Nyctanthes Arbortristis* in rats is evident from its significant reduction in titratable acidity, the number of ulcer index (P < 0.05). The reduction in NP-SH concentration, gastric wall mucus concentration and volume of gastric content also confirms the antiulcer property of the tested material. The histopathological study also showed much reduction in gastric lesions; hemorrhage, erosion and ulceration suggested that *Nyctanthes Arbortristis* could suppress gastric damage induced by ethanol.

The preliminary phytochemical analysis of *Nyctanthes Arbortristis* extract showed the presence of flavonoids, cucurbitacins, momordicine and glycosides. It is also reported that the aqueous extract is rich in flavanol quercetin, which was earlier reported for its antiulcer property. The cucurbitacins, momordicine are among the cytoprotective materials isolated from this plant. The antioxidant components from many plant extracts have been extensively confirmed for their antiulcerogenic efficacy. It is suggested that these active compounds would be able to stimulate prostaglandin secretion and counteract the deteriorating effects of reactive oxidants in gastrointestinal lumen. The antiulcer activity of *Nyctanthes Arbortristis* may be attributed to its polyphenolic constituents, particularly quercetin, reported from it. In this study, we observed that the aqueous extract of *Nyctanthes Arbortristis* provides significant antiulcer effect against gastric ulcers in...
rats, a fact that supports the traditional use of the decoction of *Nyctanthes Arbortristis* for its antiulcer effect.

**Conclusion**

This study revealed the therapeutic efficacy of the aqueous extract of leaves of *Nyctanthes arbortristis* in rats for the treatment of peptic ulcer disease. The 400 mg dose of aqueous extract significantly protected the mucous from being damaged than the hydro-alcoholic extract. Due to presence of compounds like flavanoids, tannins and alkaloids, there are possibilities of development of herbal formulation using this aqueous extract. Thus, signifying that this study serves as a forward step for future works on peptic ulcer.

**References**

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