EVALUATION OF ANTIULCER, ANTI-INFLAMMATORY & ANALGESIC POTENTIAL OF CUCURBITA PEPO. VAR. FASTIGATA SEED EXTRACT

Roshni R S Soni, Dr Manoj Bali
Assistant Professor, Professor
Department of Applied Science
Quest group of Institutions, IKG Punjab Technical University(Jallandhar), Mohali, India

Abstract: The current study aims to evaluate the antiulcer, anti-inflammatory and analgesic potential of the methanolic extract of Cucurbita pepo. var. fastigata seeds (MECP). Extraction of the seeds has been carried out with solvents of increasing polarity (Chloroform, Acetone and Methanol). The methanolic extract was evaluated against gastric ulcerations by Pyloric Ligation (PL) & Ethanol Induced Ulcer Models. Further the methanolic extract was evaluated for Anti-inflammatory activity using Carrageenan induced Paw edema model & for Analgesic activity using Tail Flick Test. Administration of MECP shows a reduction in the gastric secretion & Ulcers. Results of both PL & EI ulcer model reveal that a significant reduction in gastric secretions is seen at i.e. 100 mg/kg, which was in comparison of the standard drug Rantidine (50mg/kg). The methanolic extract significantly attenuated the paw edema in rats. However the maximum reduction of paw volume is observed at a dose of 200 mg/kg which was comparable to effect of diclofenac sodium (12.5 mg/kg). The extract showed significant analgesic activity, the reaction time is comparable to standard drug Morphine (10 mg/kg) at a concentration of 300 mg/kg. Presence of antioxidants in the methanolic extract may be responsible for the antiulcer, anti-inflammatory & analgesic properties of the methanolic extract of C.pepo seeds.

Keywords: Antiulcer, Anti-inflammatory, Analgesic, Cucurbita pepo. var. fastigata, free radical scavenging

1. INTRODUCTION

Nature has been accomplishing the task of scrutinizing the products from combinational library that possess explicit biological benefit [1]. In customary societies, many plants are consumed as food in order to benefit health, as the nutrition and health care is interrelated [2-4]. Attention towards medicinal plants show the recognition of the legality of several traditional claims concerning the worth of natural products as therapeutic aid [5]. Numerous products from natural resources and their synthetically modified derivatives have been effectively developed for the treatment of human diseases in all therapeutic areas[6].

Over 10% of the world population is affected by ulcers in the gastrointestinal system, major causes being chronic alcohol intake, excessive stress, smoking, regular intake of non-steroidal anti-inflammatory drugs. Peptic ulcer characterized by inflammation, mucosal bleeding & abdominal pain may also be caused by H.pylori bacterial infection [7-8]. The ulcers result from the imbalance between gastroprotective agents like mucus, bicarbonates & prostaglandins & acid, pepsin, bile salts etc [9]. These days various approaches like inhibition of gastric acid secretion, gastro-
protection, apoptosis blocking, and stimulation of epithelial cell proliferation have been adopted for managing gastric ulcer. Chronic use of conventional drugs like histamine receptor antagonists, proton pump inhibitors, antacids anticholinergics lead to undesirable side effects and alteration of biochemical mechanisms in adverse cases. In order to avoid the side effects, use of herbal medicines has been prevalent in recent times. The invasion of body by infectious microorganisms such as bacteria, viruses or fungi, which generally reside in a particular tissue or blood flow, causes inflammation [10–12]. Inflammation may also occur in response of cell death, tissue injury, cancer ischemia & degeneration[10,13,14]. Commonly used inflammation therapy include non-steroidal anti-inflammatory drugs and glucocorticoids. Natural anti-inflammatory compounds have attracted enormous attention of the researchers since various side effects are associated with chemical based drugs [15].

In spite of latest developments in pain therapies, the medicine community is still searching for Safe, effectual and potent analgesic drugs for treating condition of chronic pain [16]. Many patients suffering from intense pain due to cancer or severe injury have to depend on peripheral or centrally acting drugs like morphine, asprin, and nonsteroidal anti-inflammatory drugs [17-18]. Studies reveal that these opiates cause addiction & physical dependency whereas NSAIDs cause gastrointestinal disorders [19-20]. In order to overcome such side effects discovery of safe alternatives for curing pain is crucial [21]. The opioid dependence can be avoided by the use of natural pharmaceuticals as an alternative to cure pain[22].

The Cucurbita pepo. var. fastigata belongs to the Cucurbitaceae family which consists of 130 genera and 800 species. Family “Cucurbitaceae” are popularly known as Cucurbits, generally known as gourd family and distributed mainly in Torrid Zone and between Tropic of Cancer and Tropic of Capricorn. Literature reveals that family Cucurbitaceae is one of the most genetically diverse groups of food plants[23]. The family finds an economic importance as the fruits of plants like Benincasa, Cucurbita, Cucumis, Lagenaria, Momordica, Luffa and Trichosanthes. Fleshy fruits of Citrullus and Cucumis are suitable for eating and the fruits of cucumber are widely used in salad[24-25]. Literature reveals that C. pepo seeds have been used in the managing benign prostatic hiperplasia (BPH). Studies indicate that pumpkin seeds can improve the symptoms of BPH like reduction of PBP (protein binding prostate) levels [26]. It is also widely used as a hypoglycaemic agent [27]. Many pharmacological studies have established hepatoprotection [28], antioxidant [29-30] anticancer [31], [32], anti inflammatory[33] antidiabetic [34] and antiulcer activities [35]. Oil extracted from Cucurbita pepo. seeds is recommended in nutritional and medicinal purpose as it acts as a potential drug to heals wounds in animals[36]. The seeds, in addition to their roles as food additives and supplements, may also be used as an efficient and economical sources of antibacterial agents for the treatment of bacterial infections[37]. The methanolic, chloroform and ethylacetate extracts of C. pepo fruits also possess immunomoduulatory effects and thus can therefore act as immunonutrient [38-39]. The natural plant components found in pumpkin could recover the liver against alcohol-induced liver toxicity and oxidative stress in rats [40]. The antiulcer, anti-inflammatory, and analgesic studies have not yet been reported for the seeds of Cucurbita pepo var. fastigata, so the present study has been carried out to evaluate the antiulcer, anti-inflammatory, and analgesic potential of methanolic extract of C.pepo var. fastigata seeds.

2. METHODS

2.1 Chemicals

Rantidine, Diclofenac sodium, Pentobarbitone & Morphine were obtained as free samples from Jackson Laboratories, Amritsar, Punjab. The solvents like hexane, chloroform, ethyl acetate and methanol & Etahanol were of analytical grade and procured from SD Fine Chemical.

2.2 Plant Material

The seeds of Cucurbita pepo. var. fastigata were bought from Local Market of Kharar( PB) /Roopnagar (PB)/ Chandigarh (UT) and Delhi, 2013. The seeds were authenticated by Prof. Satwinderjeet Kaur and the letter vide ref no: 0176 has been deposited in the Botanical and Environmental Science Department, Guru Nanak Dev University, Amritsar. The seeds were cleaned, washed, dried for two days and crudely powdered in a grinder at room temperature. The sample was kept in light-protected air tight container.
3. EXPERIMENTAL ANIMALS

Wistar rats were used for carrying out the animal study. The animals of either sex were purchased from Guru Angad Dev Veterinary and Animal Sciences University Ludhiana / National Institute of Pharmaceutical Education and Research (NIPER) Mohali. The animals were kept under proper care as per the guidelines by the committee the purpose of Control & Supervision of Experiments on Animals (CPCSEA), Ministry of Environment & Forest, Govt. of India (Ref No: 874/ac/05/CPCSEA) and the experiment was carried out according to the protocols approved & recommended by Institutional Animal Ethics Committee (IAEC).

4. EXTRACTION

The powdered seed material was subjected to defatting i.e. removal of fats using hexane and then extraction was carried out using solvents of increasing polarity such as Chloroform, Acetone and Methanol by cold maceration process for 24 h. The solvents were completely removed by rotary evaporator and crude extracts were obtained and stored in the refrigerator. Methanolic extract with maximum yield was further used for evaluation of their antiulcer, anti-inflammatory and analgesic activities.

5. ANTIULCER ACTIVITY

5.1 Experimental design for Pyloric ligation induced gastric ulcer model

Animals were separated into 6 groups, each one comprising of 6 rats.

**Group I:** Normal/Sham control was subjected to PL without surgical procedure.

**Group II:** Subjected to pyloric ligation for 4 hours for the induction of ulcer(Diseasecontrolgroup).

**Group III:** Standard (Rantidine 50 mg/kg p.o.) was administered 1hr before PL on the day of experiment. (Standard treatment group)

**Group IV:** MECP (50 mg/kg p.o.) was administered 1hr before PL on the day of experiment.

**Group V:** MECP (75 mg/kg p.o.) was administered 1hr before PL on the day of experiment.

**Group VI:** MECP (100 mg/kg p.o.) was administered 1hr before PL on the day of experiment.

Seed extracts (50, 75 and 100 mg kg\(^{-1}\)) were continuously administered for a period of 8 days. On last day (8\(^{th}\)) normal saline, ranitidine and methanolic extract were administered 1hour prior to pyloric ligation. Pentobarbitone (35mg/kg, i.p.) was used to anaesthetize the animals and the abdomen was cut open through a midline incision. The pylorus was secured and ligated with silk sutures, after which the wound was closed and the animals were allowed to recover from anesthesia [41-42]. Following ligation of the pylorus, drinking water was with held, animals were sacrificed, stomach was removed [43] and the gastric juice was collected after 4 hours.

5.2 Experimental design for Ethanol induced gastric ulcer model

Animals were divided into 6 groups, each comprising of 6 rats.

**Group I:** Normal/Sham control was subjected to surgical procedure without administering Ethanol.

**Group II:** Rats were administered 1ml of absolute ethanol (99.9%) before surgical procedure.

**Group III:** Standard (Rantidine 50 mg/kg p.o.) was administered 1hr before administering Ethanol on the day of experiment.

**Group IV:** MECP (50 mg/kg p.o.) was administered 1hr before administering Ethanol on the day of experiment.

**Group V:** MECP (75 mg/kg p.o.) was administered 1hr before administering Ethanol on the day of experiment.

**Group VI:** MECP (100 mg/kg p.o.) was administered 1hr before administering Ethanol on the day of experiment.
Antiulcer activity can be evaluated by ethanol induced gastric ulceration in rats. Ulcers were induced by administering 1ml of absolute ethanol (99.9% , p.o.) to each rat [44]. After 1 hour all the rats were killed by cervical dislocation and the stomach was removed and juices were collected.

**Estimation of gastric volume, free acidity & total acidity:**

The gastric contents were collected through the oesophagus. The gastric juice was centrifuged and the volume was noted. Formal saline was used for inflating the stomach and was then incised through the greater curvature and examined for the number of lesions under the dissecting microscope[41].

**Estimation of gastric ulcerative index changes:**

Method of Takagi et al. [45] was used to calculate the Ulcerative index. After opening the stomach along the greater curvature, it was washed with running tap water. The ulcerative area was counted by placing the stomach on a flat wooden plate. The standard formula was used to calculate the ulcer indexes for each stomach.

Following formula was used to determine the ulcer index:

\[
\text{Ulcer Index} = \frac{10}{X} \text{ where, } X = \frac{\text{Total mucosal area}}{\text{Total ulcerated area}}
\]

Percentage ulcer protection was calculated using the formula:

\[
\text{Ulcer protection} (%) = \left( \frac{U_c - U_t}{U_c} \right) \times 100
\]

Where: \( U_c \) = Ulcer index of treated group, \( U_t \) = Ulcer index of disease control group

6. **ANTI-INFLAMMATORY ACTIVITY**

**Experimental design for Carrageenan induced Paw edema model**

The animals of either sex were divided into five groups each composed of six animals

**Group I:** Normal Control (Saline 0.9% w/v)

**Group II:** Disease Control (Carragen 1%)

**Group III:** Diclofenac sodium (12.5 mg/kg , p.o.) Standard group

**Group IV:** 1st Treatment (100mg/kg)

**Group V:** 2nd Treatment (200mg/kg)

Paw edema was induced by injecting 0.1ml of 1% carrageenan in saline into the sub plantar tissue of the left hind paw of each rat[46-47]. The different doses of extract were administered orally 30 min prior to carrageenan administration. The paw volume was measured at the time intervals of 60, 120, 180, 240 & 720 minutes by mercury displacement method using plethysmometer (Labco, India). The paw volume in the test group (treatment group) was compared with the standard group (Group III) treated with standard drug diclofenac sodium.

7. **ANALGESIC ACTIVITY**

**Experimental Design for Tail flick test model**

The animals of either sex were divided into six groups each composed of six animals

**Group I:** Normal Control (0.9 % w/v Saline, p.o.)

**Group II:** Morphine (10 mg/kg) standard group.

**Group III:** 1st Treatment (100mg/kg)
Group IV: 2nd Treatment (200mg/kg)

Group V: 3rd Treatment (300 mg/kg)

Prior to analgesic experiment the animals were screened for the sensitivity test by placing the tip of the tail on the radiant heat source before the conduct of the study. Any animal which withdraws the tail before 5sec were rejected from the study. The Tail flick latency time for all the five groups was noted at the start of experiment followed by observation at the intervals of 30, 60, 90, & 120 minutes. The tail flick time of the test doses (100, 200, 300 mg/kg extract) was compared with the standard drug Morphine (10 mg/Kg).

8. STATISTICS

Descriptive statistics & comparisons of differences between each data set was calculated by the use of sigma stat 3.5 trial version software. The data was expressed as mean± SEM and analyzed by one way ANOVA in each experiment. Statistical significance was accepted at the level of p<0.05. In the case of significance variation (p< 0.05) the values were compared by Dunnet test.

9. RESULT AND DISCUSSION

9.1 ANTIULCER ACTIVITY

It is evident from the results of present investigation that methanolic extract of C.pepo var. fastigata possess antiulcer activity in Pyloric ligated and Ethanol induced ulcer in rats. Anti-ulcer activity was evaluated by calculating the ulcer index parameter because the formation of ulcers have a direct link with factors like gastric volume, free and total acidity[43]. In In PL model the pylorous was ligated which lead to excessive production of gastric acid whereas in EI model ulcers were induced by administering 1ml of absolute ethanol (99.9% , p.o.). In each model the animals were pre treated with & C. pepo var. fastigata seed extract at different doses (50, 75 & 100 mg/kg). Result reveals that a significant reduction in the above said parameters is seen at the maximum dose i.e. 100 mg/kg for the C.pepo var. fastigata seed extracts in both the models, which was in comparison of the standard drug Rantidine (Table:1,2 ). A significant reduction in ulcer ie 76.69% by C. pepo var. fastigata seed extract in PL model & 76% in EI model has been observed at a concentration of 100 mg/kg, which is in comparison with standard drug Rantidine.( Figure:1,2).
Table- 1  Effect of methanolic extract of C.pepo var. fastigata seeds on gastric secretion, free acidity in pyloric ligated induced gastric ulcer

<table>
<thead>
<tr>
<th>Groups</th>
<th>Dose (mg/kg)</th>
<th>Gastric Volume (ml/100g)</th>
<th>Free Acidity (mEq/l)</th>
<th>Total Acidity (mEq/l)</th>
<th>Ulcerative Index % age Inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Control/Sham control</td>
<td>-</td>
<td>1.25, 1.27, 1.28 = 1.26 ± 0.008</td>
<td>31.22, 32.12, 32.22  = 31.85 ± 0.31</td>
<td>58.22, 59.12, 59.29 = 58.87 ± 0.33</td>
<td>0±0.0</td>
</tr>
<tr>
<td>PL (Disease Control)</td>
<td>-</td>
<td>2.79, 2.84, 2.86 = 2.83 ± 0.020</td>
<td>62.38, 60.22, 62.39 = 61.66 ± 0.72</td>
<td>108.22, 109.2, 109.15 = 108.85 ± 0.31</td>
<td>5.42, 5.83, 5.1 = 5.45 ± 0.21</td>
</tr>
<tr>
<td>Ranitidine (Standard drug treatment group)</td>
<td>50</td>
<td>1.22, 1.29, 1.33 = 1.28 ± 0.032</td>
<td>29.27, 28.22, 27.41 = 28.30 ± 0.53</td>
<td>58.22, 57.32, 58.51 = 58.01 ± 0.35</td>
<td>1.42, 1.21, 1.1 = 1.24 ± 0.093</td>
</tr>
<tr>
<td>MECP</td>
<td>50</td>
<td>2.25, 2.27, 2.30 = 2.27 ± 0.025a</td>
<td>36.22, 37.62, 37.64 = 37.16 ± 0.81a</td>
<td>74.22, 75.22, 74.27 = 74.57 ± 0.56a</td>
<td>2.2, 2.4, 2.4 = 2.33 ± 0.06a</td>
</tr>
<tr>
<td>MECP</td>
<td>75</td>
<td>2.17, 2.12, 2.15 = 2.14 ± 0.014a</td>
<td>34.38, 35.22, 34.26 = 34.62 ± 0.30a</td>
<td>67.21, 68.32, 67.46= 67.66 ± 0.33a</td>
<td>1.81, 2.12, 1.9 = 1.94 ± 0.09a</td>
</tr>
<tr>
<td>MECP</td>
<td>100</td>
<td>1.32, 1.40, 1.46 = 1.39 ± 0.56b</td>
<td>25.38, 26.22, 26.94 = 26.18±0.45b</td>
<td>60.23, 61.20, 60.16= 60.53 ± 0.33b</td>
<td>1.21, 1.3, 1.3 = 1.27 ± 0.03b</td>
</tr>
</tbody>
</table>
Figure-1 Graphical representation of % age inhibition of wild C. pepo var. fastigata methanolic seed extract
Table-2 Effect of methanolic extract of C.pepo var. fastigata on gastric secretion, free acidity in ethanol induced gastric ulcer

<table>
<thead>
<tr>
<th>Groups</th>
<th>Dose (mg/kg)</th>
<th>Gastric Volume (ml/100g)</th>
<th>Free Acidity (mEq/l)</th>
<th>Total Acidity (mEq/l)</th>
<th>Ulcerative Index</th>
<th>% age Inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Control group</td>
<td>-</td>
<td>1.28, 1.26, 1.26= 1.26 ± 0.01</td>
<td>30.21, 32.11, 32.18= 31.5 ± 0.01</td>
<td>57.22, 58.12, 58.29= 57.87 ± 0.57</td>
<td>0±0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>EI(Disease Control)</td>
<td>1ml absolute ethanol 99.9% p.o.</td>
<td>2.84, 2.86, 2.83= 2.85 ± 0.01</td>
<td>60.38, 61.22, 58.39= 60.8 ± 0.59</td>
<td>106.18, 107.2, 109.22= 106.8 ± 1.55</td>
<td>4.24, 6.83, 5.44= 5.50 ± 1.29</td>
<td>0.0</td>
</tr>
<tr>
<td>Ranitidine(Standard drug treatment)</td>
<td>50</td>
<td>1.28, 1.34, 1.27= 1.29 ± 0.03</td>
<td>27.26, 28.66, 27.24= 27.72 ± 0.81</td>
<td>56.21, 56.32, 57.21= 56.58 ± 0.54</td>
<td>1.52, 1.42, 1.46= 1.46 ± 0.05</td>
<td>76.45</td>
</tr>
<tr>
<td>MECP</td>
<td>50</td>
<td>2.24, 2.26, 2.22= 2.24 ± 0.02a</td>
<td>32.22, 34.62, 35.64= 34.16 ± 1.75a</td>
<td>72.12, 74.22, 74.24= 73.52 ± 1.21a</td>
<td>2.1, 2.4, 2.6= 2.3 ± 0.25a</td>
<td>58.18</td>
</tr>
<tr>
<td>MECP</td>
<td>75</td>
<td>2.12, 2.14, 2.16= 2.14 ± 0.02a</td>
<td>34.28, 35.53, 34.26= 34.69 ± 0.72a</td>
<td>66.21, 68.22, 66.26= 66.89 ± 1.14a</td>
<td>1.71, 2.10, 1.94= 1.91 ± 0.19a</td>
<td>65.27</td>
</tr>
<tr>
<td>MECP</td>
<td>100</td>
<td>1.40, 1.45, 1.43= 1.42 ± 0.02b</td>
<td>22.38, 24.32, 25.84= 24.18 ± 1.73b</td>
<td>62.33, 60.20, 61.14= 61.22 ± 1.06b</td>
<td>1.26, 1.4, 1.3= 1.32 ± 0.07b</td>
<td>76</td>
</tr>
</tbody>
</table>
9.2 ANTI-INFLAMMATORY ACTIVITY

The methanolic extract of *C. pepo var. fastigata* seeds significantly attenuated the carageenan induced paw edema in rats. However the maximum reduction of paw volume for both the seed extracts is observed at a dose of 200 mg/kg which was comparable to effect of diclofenac sodium (12.5 mg/kg) as shown in table 3.

Table 3: Anti-inflammatory effects of methanolic extract of *C. pepo var. fastigata* seeds in carrageenan-induced paw edema method in rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Normal Control (Saline 0.9% w/v)</th>
<th>Disease Control (Carragen 1%)</th>
<th>Diclofenac sodium (12.5 mg/kg, p.o.) Standard group</th>
<th>1st Treatment (100mg/kg)</th>
<th>2nd Treatment (200mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>0.24±0.5</td>
<td>0.392±0.0382</td>
<td>0.354±0.017b**</td>
<td>0.36±0.0186 c ns</td>
<td>0.321±0.0284 c ns</td>
</tr>
<tr>
<td>120</td>
<td>0.24±0.5</td>
<td>0.486±0.063</td>
<td>0.471±0.025b**</td>
<td>0.48±0.0254 c ns</td>
<td>0.338±0.0218 c**</td>
</tr>
<tr>
<td>180</td>
<td>0.24±0.5</td>
<td>0.522±0.024</td>
<td>0.462±0.036b**</td>
<td>0.501±0.0376 c ns</td>
<td>0.342±0.0278 c**</td>
</tr>
<tr>
<td>240</td>
<td>0.24±0.5</td>
<td>0.576±0.298</td>
<td>0.405±0.026b**</td>
<td>0.454±0.0243 c ns</td>
<td>0.354±0.0224 c**</td>
</tr>
<tr>
<td>720</td>
<td>0.24±0.5</td>
<td>0.569±0.0276</td>
<td>0.262±0.021b**</td>
<td>0.351±0.0218 c ns</td>
<td>0.289±0.0276 c**</td>
</tr>
</tbody>
</table>

9.3 ANALGESIC ACTIVITY

The *C. pepo var. fastigata* seeds extract showed significant analgesic activity. As shown in table 4, the reaction time is comparable to standard drug Morphine at a concentration of 300 mg/kg for both the seed extracts.
## Table 4: Analgesic effect of C. pepo var. fastigata by tail flick test

<table>
<thead>
<tr>
<th>Group</th>
<th>Dose(mg/kg)</th>
<th>Tail flick latency(time in sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 sec</td>
<td>30 min</td>
</tr>
<tr>
<td>Control</td>
<td>3.36±0.02</td>
<td>3.61±0.04</td>
</tr>
<tr>
<td>Morphine (10)</td>
<td>3.24±0.05</td>
<td>7.12±0.01&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>MECP (100)</td>
<td>3.48±0.18</td>
<td>4.28±0.06</td>
</tr>
<tr>
<td>MECP(200)</td>
<td>3.72±0.03</td>
<td>4.89±0.09&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
<tr>
<td>MECS (300)</td>
<td>3.58±0.07</td>
<td>5.54±0.08&lt;sup&gt;a,b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

### 9.4 CONCLUSION

On the basis of the results of the above study, it can be concluded that the methanolic extract of Cucurbita pepo. var. fastigata seeds possess notable antiulcer, anti-inflammatory, & analgesic activity. However, further investigations are required to comprehend the precise mechanisms of action and isolation of the compound(s) accountable for such activities.

### 9.5 DISCUSSION

Results of the present investigation reveals that extract obtained from the seeds of C.pepo var. fastigata show antiulcerative, anti-inflammatory, & analgesic activity in rodent model. The PL and Ethanol induced model show significant reduction in gastric acids & ulcerative index. Seed extract was also effective in reducing inflammation in paw edema model.

Ulcer is directly related to factors such as gastric volume, free acidity and total acidity therefore ulcer index parameters are used for evaluation of antiulcer activity. Since formation of ulcer in both models occurs by different mechanisms, it is not possible to suggest a single mechanism for antiulcer effect.

Anti-inflammatory effect of natural products has frequently been investigated by Carrageenan induced paw edema model. Inflammatory stimulus leads to accumulation of leukocytes in pleural cavity, as well as enhancement of LTB<sub>4</sub> level in pleural exudates. The neutrophile migration to the affected area liberate toxic oxygen radicals in the extracellular medium. The seed extract effectively inhibits the leukocyte influx and rise in LTB<sub>4</sub> levels.

The studies show significantly good results for analgesic tests in rats. The possible reason for reduction in algesia is the free radical scavenging activity of seed extracts. However more elaborative studies are required to conclude regarding the exact mechanism.
Conflict of Interest Statement:
We declare that we have no conflict of interest.

Authors Contribution
Roshni R.S. Soni- Conceived idea of the study, participated in its design, Performed laboratory work and coordinated and drafted the manuscript. Also, performed statistical analysis
Manoj Bali- Participated in the sequence alignment and drafted the manuscript & Supervised the study from conceiving of idea to drafting of manuscript.

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