

## **REPORT**

# **Analgesic and anti-inflammatory activity of aqueous-methanolic extract of *Aerva javanica***

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**Abstract:** The present study was aimed to investigate the analgesic and anti-inflammatory activity of aqueous methanolic extract of *Aerva javanica*. For measuring analgesic activity, writhing test, hot plate method and formalin test were performed and abdominal writhing was induced by intra-peritoneal injection of 0.2ml of 3% acetic acid. While in formalin test, pain was experimentally induced by injecting 25  $\mu$ l of 2.5% formalin in left hind paw. In hot plate method, pain was induced thermally by keeping the animals on a hot plate with temperature of about 51°C. Anti-inflammatory activity was assessed by carrageen an induced mice paw edema. The results showed that the extract had significant analgesic activity ( $p < 0.05$ -  $p < 0.001$ ) and anti-inflammatory activity ( $p < 0.01$ - $p < 0.001$ ). Therefore, it was concluded from this study that the extracts of *Aerva javanica* may be used against pain and inflammation.

**Keywords:** *Aerva javanica*, NSAIDs, Carrageen an, Yeast, Pyrexia, Formalin, Analgesia

## **INTRODUCTION**

The problem of resistance and tolerance to the existing drugs has created a decreased efficacy of these drugs in use. This problem has been tried to be overcome by increasing the drug delivery to the target site by the use of polymers (Khalid *et al.*, 2009) or through nanotechnology (Naz *et al.*, 2012; Ehsan *et al.*, 2012), synthesis of new drugs, either by the use of proteomics (Qadir, 2011; Qadir and Malik, 2011), or synthesis of drugs from lactic acid bacteria (Masood *et al.*, 2011), or from marine microorganisms (Javed *et al.*, 2011). However, nowadays, the trend is being changed to the use of herbal products or their extracts. The plant kingdom still holds many substances of medicinal value: a large numbers of plants are constantly being screened for their possible pharmacological value particularly for their analgesic (Parveen *et al.*, 2014) anti-inflammatory (Qadir, 2009), hypotensive (Qadir, 2010), antihyperlipidaemic (Ahmad *et al.*, 2012) hepatoprotective (Ali *et al.*, 2013; Mallhi *et al.*, 2014; Saleem *et al.*, 2014; Qadir *et al.*, 2014), hypoglycaemic (Qadir and Malik, 2010), amoebicidal (Asif and Qadir, 2011), anti-fertility, cytotoxic, antibacterial (Amin *et al.*, 2012; Azam *et al.*, 2013), anti-viral (Ali *et al.*, 2012; Aslam *et al.*, 2012) spasmolytic (Janbaz *et al.*, 2014), bronchodilator (Janbaz *et al.*, 2013a), antioxidant (Janbaz *et al.*, 2012), anti-diarrheal (Janbaz *et al.*, 2013b), anti-cancer (Ali *et al.*, 2013a & b; Saleem *et al.*, 2013) and anti-Parkinsonism properties.

*Aerva javanica* is prevalent in Asia, Africa and Australia. It has anti-diabetic, antimicrobial, cytotoxic, anti-plasmodial and anti-diarrheal activities (Qureshi *et al.*, 2010). The objective of the present study was to evaluate the analgesic and anti-inflammatory activity of *Aerva javanica*.

## **MATERIALS AND METHODS**

### ***Plant collection***

Leaves and flowers of *Aerva javanica* were used for this study. Plant was collected from rural area of Faisalabad, Pakistan. The plant was identified and authenticated by Dr. Anwar Majeed, Assistant Professor of Botany, University of Agriculture, Faisalabad, Pakistan and submitted to the herbarium for future reference.

### ***Extraction of plant material and sample preparation***

The powdered plant was successively extracted by method of cold maceration. 2kg of the plant powder were extracted by using aqueous methanol (70%). The powdered plant was soaked for 1 week with irregular shaking and after each soaked plant material were passed through muslin cloth and then filtered out with the help of filter paper. Drying of extracts was done by using the rotary evaporator. For administration, the extracts of plant were dissolved in normal saline.

### ***Analgesic activity***

#### ***i) Against acetic acid induced writhing***

After 30 minutes of treatment (100 mg/kg of the standard and the extracts), mice were injected intraperitoneally 0.2

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**Table 1:** Analgesic activity of aqueous-methanolic extract of *Aerva javanica*

Treatment/dose	No. of Writhing (Mean ±SEM)	No. of Paw lickings (Mean ±SEM)	Reaction time in sec (Mean ±SEM) after 60 min
Control (Normal saline 2 ml/kg)	46.4±4.4	85±5.1	3.68±0.3
Standard (Aspirin 100 mg/kg)	14.6±2.4***	23.2±3.0**	12.86±0.9***
Aqueous methanolic extract of <i>Aerva javanica</i> (100 mg/kg)	30.6±4.0*	33.2±4.5**	6.9±0.9***
Aqueous methanolic extract of <i>Aerva javanica</i> (300 mg/kg)	21.6±2.4**	28.2±2.5***	9.1±1.1***

**Table 2:** Anti-inflammatory activity of aqueous-methanolic extract of *Aerva javanica* on carrageen an induced edema in mice

Treatment/dose	Level of Inflammation (Mean±SEM)			
	0 hr	1 hr	2 hr	3 hr
Control (Normal saline 2 ml/kg)	2.4±0.1	2.96±0.2	3.15±0.38	3.38±0.3
Standard (Aspirin 100 mg/kg)	2.27±0.15*	2.09±0.09***	1.65±0.25***	1.2±0.16**
Aqueous methanolic extract of <i>Aerva javanica</i> (100 mg/kg)	2.76±0.17**	2.48±0.1***	2.12±0.08**	1.88±0.1**
Aqueous methanolic extract of <i>Aerva javanica</i> (300 mg/kg)	2.88±0.25***	2.31±0.15***	1.94±0.45**	1.6±0.09***

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

ml of 3% acetic acid to induce writhing. Acetic acid causes stretching of hind limb along with abdominal constrictions, which was measured between 5 to 15 minutes after acetic acid administration. After that, the response of different extracts was compared with the responses of animals in control group.

*ii) Formalin induced paw licking*

2.5% Formalin was injected under the surface of hind paw of mice after 1 hour of administration of extracts (100 mg/kg). The responses were observed immediately after administration of injection for 30 minutes.

*iii) Eddy's hot plate method*

After 1 hour of administration of different doses of extracts (100 mg/kg), the mice were placed on hot plate. The temperature was kept at 55-56°C. The reaction time was the time taken by the animal to lick the hind paw or jumps; and was measured at 0, 30 and 60 minutes.

**Anti-inflammatory activity**

*Aerva javanica* extracts were examined for their anti-inflammatory activities against Carragenan induced paw edema. After 1 hour of treatment (100 mg/kg of the standard and the extracts), 0.1 ml of freshly prepared Carragenan suspension (1%) was injected into the sub plantar surface of hind paw. This produced inflammation. The circumference was calculated at 0, 1, 2 and 3 hours after administration of injection.

**STATISTICAL ANALYSIS**

Values were given as mean ± SEM and the statistical analysis used was analysis of variance (ANNOVA). p<0.05 was considered significant.

**RESULTS**

Analgesic activity of *Aerva javanica* is given in table 1. Aqueous methanolic extract of *Aerva javanica* significantly (p<0.05-p<0.01) reduced the acetic acid induced writhing in dose dependent manner. Similarly, the extract significantly (p<0.05-p<0.001) reduced formalin induced paw licking as compared to control group. In hot plate method, after 60 minutes, the extract increased the reaction time significantly (p<0.05- p<0.01) as compared to control. All these results had non-significant difference from the standard aspirin. Both the extracts also produced a significant anti-inflammatory effect (p<0.01-p<0.001) between 2-3 hours of post inflammation induction (table 2).

**DISCUSSION**

*Aerva javanica* contains flavonoids such as chrysoeriol, isohemnetin-3-o-rutinoside and kaempferol in all the aerial parts of the plant (Saleh *et al.*, 1990). The flavonoids have anti-inflammatory characteristics (Bittar *et al.*, 2000). Therefore, the analgesic and anti-inflammatory activities of *Aerva javanica* might be due to these flavonoids. It was concluded from the present study that aqueous methanolic extract of *Aerva javanica* have analgesic and anti-inflammatory activities.

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