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[Research article]

Screening of analgesic and antipyretic properties on ethanolic extract of *argemone mexicana* linn

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ABSTRACT

The aim of this study was to investigate the analgesic and antipyretic properties of ethanolic extract of Argemone mexicana Linn. Also, the Phytochemical screening was conducted and the extract showed the presence of flavonoids, alkaloids, terpenoids, tannins, and steroids. Analgesic and antipyretic effects of ethanolic extract of Argemone mexicana linn were investigated at doses of 50 mg/kg b.w. and 100 mg/kg b.w. using tail immersion and yeast-induced pyrexia tests. Oral administration of Argemone mexicana ethanolic extract produced significant ($P<0.001$) raised the pain threshold at different time of observation (0-150min) in comparison with control. Tested on yeast-induced pyrexia in rats, significantly ($P<0.0001$) reversed hyperthermia at different does level. The results of pharmacological studies performed in the present study suggest that the extract possesses potent analgesic and antipyretic effects.

Keywords: Argemone mexicana Linn, Ethanolic extract, Analgesic activity, Antipyretic activity.

INTRODUCTION

Argemone mexicana linn is a tropical plant found in hottest parts of India, belongs to Papaveraceae family. The plant is strong branched prickly annual, 60-90 cm in height with yellow latex; leaves simple, sessile, spiny, semi-amplexicaul, sinuate-pinnatified, variegated with white, spinous, veins white; flowers large, bright yellow, terminal on short leafy branches; fruits prickly capsules, oblong –ovoid, opening by 4-6 valves; seeds numerous[1-3]. The various parts of plant like root, milky juice of the fresh plant, latex, seeds, leaves, stem and flowers are used for much therapeutic purpose. The plants is bitter, acrid, cooling, vulnerary, diuretic, purgative, anti-inflammatory, expectorant, aphrodisiac, emetic, depurative, anodyne, anthelmintic, antipyretic, ophthalmic, stomachic and sedative. The roots are useful in guinea-worm infestations, skin diseases, leprosy, malarial fever and vesicular calculus. The leaves are useful in cough, wounds, ulcers, and

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skin diseases. The latex is used in dropsy, jaundice, blisters, indolent ulcers, conjunctivitis, skin diseases, burning sensation. Seeds are useful in asthma, dental caries, colic and flatulence[4-9].

In the present paper therefore, we report on the analgesic and antipyretic effect of whole plant of ethanolic extract of Argemone mexicana in tail immersion and yeast-induced antipyretic effects as an attempt to validate its traditional uses.

MATERIALS AND METHODS

Preparation of ethanolic extract

The shade dried whole plant of coarse powder (250 gm) was packed well in soxhlet apparatus and was subjected for continuous hot extraction. The extract was filtered while hot and the resultant extract was distilled in vacuum under reduced pressure in order to remove the solvent completely. The obtained extract was dark wine red in colour followed by the ethanolic extract of Argemone mexicana (AME) dried and kept in a desiccator till the experimentation.

Phytochemical Screening of Extract

In order to obtain phytochemical potency, the extract was subjected for phytochemical screening. Qualitative phytochemical analysis was done to find the various phytoconstituents such as alkaloids, carbohydrates, tannins and phenols, flavonoides, glycosides, gums and mucilage, fixed oils and fats and saponins[10, 11].

Experimental design

Analgesic activity of AME by Tail immersion method[12,13]

Young healthy Albino wistar rats of either sex (170–210 g body weight) were selected for the analgesic study. They were placed into individual restraining cages leaving the tail hanging out freely. The animals were allowed to adapt to the cages for 30 min before testing. Then animals were divided in to five groups each group contains six animals. The Control group received only Saline, Standard group received Pentazocin, Vehicle control group received 1% CMC, Test 1 received 50 mg/kg AME and Test 2 received 100 mg/kg AME respectively. The lower 5 cm portion of the tail was marked. After administration of the drugs, the reaction time was measured at 0, 30, 60, 90, 120 and 150 minutes. The results are tabulated in table No.1.

The percentage of pain protection was calculated as

$$\text{Inhibition (\%)} = \frac{\text{Test} - \text{Control}}{\text{Control}} \times 100$$

Tail immersion study was carried out as

Group I: Control (Saline received)
Group II: Vehicle Control (1% CMC received)
Group III: Standard (Pentazocin 5 mg/kg received)
Group IV: Test 1 (AME of 50 mg/kg)
Group V: Test 2 (AME of 100 mg/kg)

Figure: 1 Analgesic activity by tail immersion methodLeaves Extract

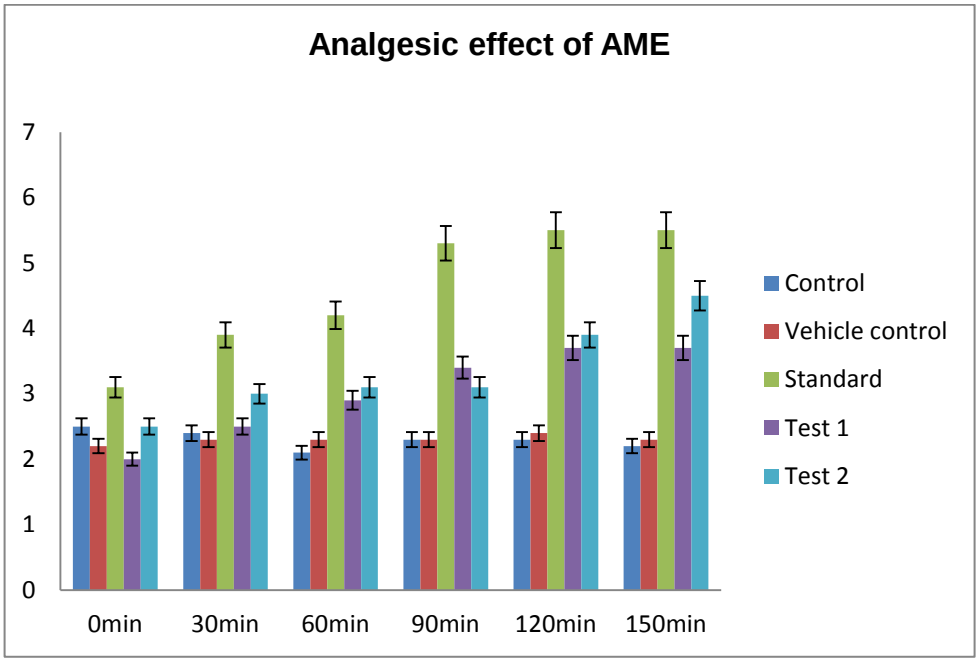
S.no	Group	Tail withdrawing response						MEAN±STD
		0min (time in seconds)	30min (time in seconds)	60min (time in seconds)	90min (time in seconds)	120min (time in seconds)	150min (time in seconds)	
1	**Control** (Saline received)	2.5	2.4	2.1	2.3	2.3	2.2	2.5±0
2	**Vehicle control** (1%CMC received)	2.2	2.3	2.3	2.3	2.4	2.3	2.3±0.063
3	**Standard** (Pentazocin received)	3.1	3.9	4.2	5.3	5.5	5.5	4.5833±1.0008$^{\alpha}$

4	**Test 1** (50mg/kg of extract received)	2.0	2.5	2.9	3.4	3.7	3.7	3.03333±0.6918$^{\beta}$
5	**Test 2** (100mg/kg of extract received)	2.5	3.0	3.1	3.1	3.9	4.5	3.35±0.720$^{\infty}$

$^{\alpha}$ p≤ 0.000117507
$^{\beta}$ p≤ 0.005432139
$^{\infty}$ p≤ 0.017133356

All data were expressed as Mean ± SEM and analyzed statistically by using Two way ANOVA followed by a Bonferroni post test. A difference was considered significant at P value less than 0.05. **p<0.01, ***p<0.001 when compared to vehicle control. The results have been shown in Table 1 and Figure 1

Figure 2. Analgesic activity of AME



Anti pyretic study of AME by Brewer's yeast induced pyrexia[12,13]

The antipyretic activity was evaluated using adult healthy Albino wister rats were selected between the weights ranging from 150-190 gm and divided in to four group containing each a animals. The pyrexia was induced by injecting the suspension of Brewer's yeast. The sight of injection was massaged in order to spread the suspension beneath the skin. The room temperature was kept at 22-24 °C. Immediately after yeast

administration, food was withdrawn, and then the rise in rectal temperature was recorded. The measurement was repeated after 30 minutes. The dose of the test compound and standard drug was given orally. The rectal temperature was recorded again after 30, 60, 90

and 120. Phenacetin mg/kg was selected as a standard drug.

The ability of test drugs to reverse the induced pyrexia was calculated as.

$$\text{Percent reduction} = \frac{B - C}{B - A} \times 100$$

Where,

B - Temperature after pyrexia induction

C - Temperature after 30, 60, 90 and 120 minutes

A - Normal body temperature (37.5 ºC)

The results were shown in Table 22.

Antipyretic study was carried out as

Group I: Control (Brewer's yeast +Saline))

Group II: Standard (Brewer's yeast + Phenacetin 100 mg/Kg)

Group III : Test 1 (AME of 50 mg/kg)

Group IV : Test 2 (AME of 100 mg/kg)

Antipyertic studies

	Rectal Temperature in ºC							
S.no	**Group**	**Initial (Before treating with Brewer's yeast)**	**After 18 hours**	**30min**	**60 min**	**90min**	**120min**	**MEAN±STD**
1	Control(Brewer's yeast +Saline)	37.33	40.22	40.12	40.34	40.11	40.33	39.7416±1.185
2	Standard(Brewer's yeast + Phenacetin 100 mg/Kg)	38.22	40.55	38.55	38.20	38.00	38.11	$38.605 \pm 0.9705^{\infty}$
3	Test (Brewer's yeast + 100mg/Kg of extract from stem& root)	37.82	40.65	38.89	38.32	38.30	38.35	$38.7216 \pm 1.0003^{\beta}$
4	Test (Brewer's yeast + 100mg/Kg of extract from Leaves)	37.45	39.98	38.11	38.23	38.00	38.14	$38.31833 \pm 0.860^{\alpha}$

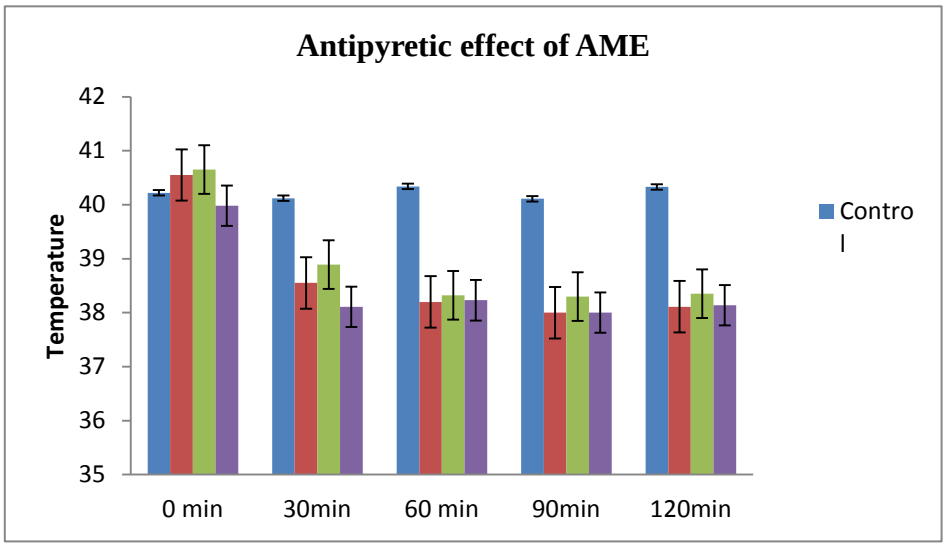
$^{\infty}$ $p \leq 0.049612013$

$^{\beta}$ $p \leq 0.420962396$

$^{\alpha}$ $p \leq 0.01$

All data were expressed as Mean ± SEM (n=6) and analyzed statistically by using two way ANOVA followed by a Bonferroni post test, *P<0.05, **p<0.01, ***p<0.001 when compared to vehicle control. The results have been shown in Table 2 and Figure 2.

Figure 2. Antipyretic activity of AME



RESULTS AND DISCUSSION

The phytochemical analysis of ethanolic extract of ***Argemonae mexicana*** showed it contains alkaolids, protein-amino acids, carbohydrates, steroids, proteins, tannins and flavonoids being the most dominant chemical constituents.

Tail immersion method was used to determine the analgesic activity. The mean reaction time in all the groups was observed before and after administration of the extract. The mean differences observed in different groups were shown in the table. The mean difference of all the groups was compared with the vehicle control group. The AME of 50 mg/kg produced 4%, 33.3%, 32.3%, 37.8% and 40.5% inhibition of pain at 30, 60, 90, 120 and 150 min interval and the AME extract of 100 mg/kg produced 20%, 32.2%, 25.8%, 41.02% and 51.1% of inhibition pain at 30, 60, 90, 120 and 150 min interval. The standard drug pentazocin 5mg/kg produced 41%, 50%, 56.6%, 58.2% and 60% inhibition of pain at 30, 60, 90, 120 and 150 min (Table 20) respectively. Mean and the data of observation were analyzed statistically. From the observation, it was concluded that the extract of AME produced significant analgesic activity in albino rats and did not produce a significant difference as compared to vehicle control ($P<0.001$**).**

Result with regard to the antipyretic effect of the AME in the pyrexic rats given in Table 22. Basal rectal temperature of rabbits before injection of the suspension of brewer's yeast in the negative control group was 37.33±1.185, in the positive control group was 38.22±0.9705. In the plant extract 50 & 100 mg/kg of treatment group, the rectal temperature was 37.82±1.0003 and 37.45±0.860. Administration of Brewer's yeast produced an increase in temperature after 18 hours. The rectal temperature recorded in the negative control group was 40.22±1.1845 and in the positive control group was 40.55±0.9704. The rectal temperature in the treatment groups was 40.65±1.00031 and 39.98±0.861. The AME extracts 50, 100 mg/kg and phenacetin reduced the body temperature to 38.35±1.0003, 38.14±0.8617 and 38.11±0.97 respectively after 150 min. AME showed significant ($p<0.0001$) anti-pyretic activity when compared to control and the effect was similar to that of standard drug Phenacetin. The maximum % reduction of temperature of extracts of 50, 100 mg/kg and standard drug were 71.1%, 80.1% & 80.8% respectively.

CONCLUSION

The present study shows potent analgesic and antipyretic effect of extract of *Argemonae mexicana* in both central as well as peripheral it is due to single or combined bioactive principles. The results obtained in this study proved that *Argemonae mexicana* possesses potent analgesic and antipyretic properties. This could provide a rationale for the use of this plant in fever and pain disorders in folk medicine.

Hence, more features of the plant can be possible more over by applying the modern analytical techniques may be adopted to prove the active compound which present in the extract & responsible for the above activities.

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