

Evaluation of Pharmacological Effect of Cassia Sophera Linn Leaves Extracts

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ABSTRACT

Cassia sophera Linn (*C. sophera*) is a medicinally important plant belonging to the family of Caesalpiniaceae. The whole part of the plant is used as traditional folk medicine and is reported to possess analgesic, anticonvulsant, antioxidant, anti-inflammatory, hepatoprotective and antiasthmatic activity. Eddy's hot plate and Analgesiometer tests were used to assess the antinociceptive activity of *Cassia sophera*. Pentobarbitone narcosis potentiation test was used to evaluate the hypnotic and sedative effect, while anticonvulsant activity was evaluated by Maximum electroshock-induced seizure test and Pentylene-tetrazol induced seizure test.

Test drug (440 mg/kg) produced significant analgesia, potentiated the pentobarbitone induced sleeping time and exhibited anticonvulsant effect against hind limb tonic extension phase of maximum electroshock-induced seizure test and seizures induced by pentylene-tetrazol.

The preliminary screening of seed extract of *Cassia sophera*, Linn. exhibited analgesic, anticonvulsant effects and potentiated pentobarbitone sleeping time. The ethanol extract of seed of *Cassia sophera*, Linn. deserves further investigation to elucidate the mechanisms of action.

Keywords: Anticonvulsant, Analgesic, *Cassia sophera*, Hypnotic, Necrosis.

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INTRODUCTION

Plant products have been part of phytomedicine since time immemorial. These can be derived from any part of the plant like leaves, flowers, bark roots, fruits, and seeds.^[1] Herbal medicines have become more popular in treating any diseases due to the popular belief that green medicine is safe, easily available and with fewer side effects. Many plants are cheaper and more accessible to most people especially in the developing countries than orthodox medicine, and there is a lower incidence of adverse effects. These reasons might account for their worldwide attention and use.^[2] Some researchers have documented the medicinal properties of some plants.^[3-5] Medicinal plant constitutes the main source of new pharmaceuticals and healthcare products.^[6] In ethno botanical literature it is mentioned to be effective in treating pityriasis, psoriasis, asthma, acute bronchitis, cough, diabetes and convulsions of children (6-12). The chemical analysis of the seed of *Cassia sophera*, Linn. revealed the presence of ascorbic acid, dehydroascorbic acid,^[13] and sosterol,^[14] but no scientific study is reported on the varietal level of plant. Therefore, in the present study ethanol extract of the seed of *C. sophera*, numerous studies were carried out on plants with antioxidant properties.^[11-13] However, there is still great interest in finding new antioxidants from natural sources. *C. sophera*, locally known as kasundi, is a medicinally important plant belonging to family caesalpiniaceae. It is one of the important medicinal plants in Asia's tropical and subtropical region, especially in India, Sri Lanka, Pakistan, Malaysia, Myanmar, Bangladesh, and most tropical countries.^[14,15] In ethno-botanical literature, the leaves are mentioned to be used for their anti-inflammatory, anti-rheumatic, and

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purgative property, as an expectorant for cough, cold, bronchitis, asthma, and in liver disorders.^[15] Earlier studies have investigated on the pharmacological activities of the seeds of *C. sophera*, including analgesic and anticonvulsant, antidiabetic, inhibition of lipid peroxidation, herbicidal, and fungicidal effects.^[16] Despite the immense ethno-medicinal properties attributed to *C. sophera*, the reported phyto-pharmacological study on various levels of this plant is relatively infrequent to the best of our knowledge.

MATERIAL AND METHOD

Plant Material

Leaves of *C. sophera* were collected from the local region in separate sterile bags from Bhopal, Madhya Pradesh, and October, 2019. Plant material (leaves part) selected for the study were washed thoroughly under running tap water and then were rinsed in distilled water; they were allowed to dry for some time at room temperature. Then the plant material was shade dried without any contamination for about 3 to 4 weeks.

Dried plant material was grinded using electronic grinder. Powdered plant material was observed for their colour, odour, taste and texture. Dried plant material was packed in air tight container and stored for phytochemical and biological studies.

Preparation of Extract

The collected seeds were powdered and extracted with 70% ethanol in a Soxhlet apparatus for 6 hours. The solvent was evaporated by heating on a water bath. The yield of the sample was 17%.

Administration of Extract and Vehicle

Twenty percent solution of extract dissolved in distilled water (W/V) was administered to the animals of test group in the dose of 440 mg/kg, by a gastric cannula. In all the tests, distilled water was given to the control group of animals in the dose of 10 mL/kg p.o.

Animals

Studies were carried out on Wistar albino rats of either sex weighing 150–200 g. All experiments were performed following the institutional Animal Ethics Committee. Animals were used in two groups of six in each experiment except Analgesiometer test, which was performed only on one group. The animals were given commercial diet and tap water. All the experiments were carried out between 08:00 and 12:00 pm at room temperature (25°C).

Pharmacological Studies

Assessment of Analgesic Activity

The central analgesic action of the test drug was studied against thermal stimuli using battery of two tests. First, by the method of Eddy's and Leimbach (15) using hot plate, while the second test was done by Davis (16) using Analgesiometer.

Eddy's Hot Plate Test

All the animals of control and test groups' initial reaction time was recorded by putting them on the Hot Plate maintained at 55.5°C. Licking of paw or jumping was taken as the

index of reaction to heat. After that, the control group was administered with distilled water while the test group was treated with test drug.

Although analgesia persisted until the end of the testing period, the effect was non-significant at 100 and 120 minutes (Table 1).

In Analgesiometer test, the initial reaction time was noted 4.26 ± 0.167 seconds. A significant increase in the reaction time was observed at 15 minutes after drug administration and was 4.76 ± 0.136 ($p < 0.05$). The peak effect was recorded during 75–90 minutes and the reaction time at 90 minutes interval increased to 6.1 ± 0.204 seconds ($p < 0.001$) as compared to the initial reaction time in the same group of animals. The analgesia persisted throughout the whole testing period, i.e., till 120 minutes (Table 2).

Hypnotic/Sedative Activity

In control group the duration of sleep was 122.8 ± 10.368 minutes. This duration increased to a significant level in test group ($p < 0.05$) and recorded 167.5 ± 8.401 minutes (Table 3).

Anticonvulsant Activity

In Supra maximal electro-shock seizure test it was observed that the test drug produced a significant reduction in the duration of extensor phase, which was reduced to 8.1 ± 0.844 seconds ($p < 0.05$), while in control group, this duration was 11.06 ± 0.530 seconds (Table 4).

In pentylenetetrazol induced seizure test, the onset of myoclonic spasm and clonic convulsion in control group was observed at 203.3 ± 15.45 seconds and 228.3 ± 14.66 seconds after PTZ injection, respectively. All the animals of control group died just after convulsions. The test drug delayed the onset of myoclonic spasm and clonic convulsion to 598.3 ± 24.2 seconds ($p < 0.001$) and 640.8 ± 23.67 seconds ($p < 0.001$), respectively (Table 5). All the animals of test group died after 45 minutes of PTZ injection.

DISCUSSION

In Hot plate test, the reaction time of test group increased to a significant level 20 minutes after the treatment ($p < 0.05$). The

Table 1: Analgesic effect of ethanol extract of seed of *C. sophera*, Linn. (440 mg/kg) by Eddy's hot plate test mean reaction time in seconds.

	Time in minutes after drug administration													
	Initial		20		40		60		80		100		120	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Mean	2.96	3.36	3.03	3.6*	3.1	4.26***	3.23	4.6**	3.2	4.16*	3.26	3.9	3.26	3.7
S.E.	0.087	0.281	0.072	0.19	0.061	0.122	0.144	0.13	0.065	0.22	0.161	0.26	0.161	0.312

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, N: 6 albino rats, A : Control group, B : Test group, Values are mean \pm S.E.M.

Table 2: Analgesic effect of ethanol extract of seed of *C. sophera*, Linn. var. (440 mg/kg) by analgesiometer test

	Mean reaction time in seconds								
	Initial	15	30	45	60	75	90	105	120
Ethanol Extract (440 mg/kg)	4.26 ± 0.167	4.76 ± 0.136*	5.1 ± 0.215***	5.56 ± 0.218***	5.96 ± 0.185***	6.1 ± 0.187****	6.1 ± 0.204****	5.6 ± 0.156***	5.33 ± 0.138**

* $p < 0.05$, ** $p < 0.02$, *** $p < 0.01$, **** $p < 0.001$, N: 6 albino rats, Values are mean \pm S.E.M, seconds ($p < 0.001$) and 3.23 ± 0.144 seconds, respectively.

Table 3: Effect of ethanol extract of seed of *C. sophera*, linn. var. (440 mg/kg) by pentobarbitone sodium-induced narcosis in rats

	Time in minutes	
	Control Group Pent. Sod. + DW	Test Group Pent. Sod. + Ethanol extract
Mean	122.8	167.5*
S.E.	10.368	8.401

* $p < 0.05$, N: 6 albino rats, Values are mean \pm S.E.M.

Table 4: Anticonvulsant effect of ethanol extract of seed of *C. sophera*, Linn. (440 mg/kg) by supra maximal electro-shock seizure test.

	Duration of extensor phase in seconds	
	Control	Alcoholic extract
Mean	11.06	8.1*
S.E.	0.530	0.844

$p < 0.05$, N: 6 albino rats, Values are mean \pm S.E.M.

Table 5: Effect of ethanol extract of seed of *Cassia sophera*, Linn. (440 mg/kg) on seizures induced by pentylenetetrazol in rats

Group	Onset of myoclonic spasm in sec after PTZ	Onset of clonic convulsion in sec after PTZ
Control (Vehicle + PTZ)	203.3 \pm 15.45	228.3 \pm 14.66
Alcoholic Extract + PTZ (440 mg/ kg)	598.3 \pm 24.2*	640.8 \pm 23.67*

$p < 0.001$, N: 6 albino rats, Values are mean \pm S.E.M.

peak effect was observed at 60 minutes interval ($p < 0.001$). In the Analgesimeter test, significant analgesic effect appeared at 15 minutes and the peak effect was observed at 75 minutes. The effect of the drug persisted up to 120 minutes. Both tests demonstrated more or less similar patterns and some differences in peak effect, probably, because the comparison of reaction time in Analgesimeter test was made with the initial reaction time in the same subjects. It is more reliable as it entails the least chances of placebo effect, while in hot plate test reaction time was compared with that of the reaction time of control group.

CONCLUSION

Although, '*Kasondi*' is a popular and investigated plant and commonly used by Unani physicians and others and has been included in many proprietary preparations, but only its sp. *Cassia occidentalis*, Linn. has been subjected for scientific studies. In our study, the seed of *Cassia sophera*, Linn. var. *purpurea*, Roxb., which is frequently used by many physicians and is preferred over *C. occidentalis* in the management of many diseases has been found to possess important pharmacological effects. It includes analgesic, hypnotic and antiepileptic effects. The findings of our study align with the description of the Unani and ethnobotanical literature and it can be used for a wide therapeutic purpose as an analgesic, sedative, and anticonvulsant agent. The ethanol extract of the seed of *C. sophera*, Linn. var. *purpurea*, Roxb. deserve further investigation for detailed elucidation of the mechanisms of action.

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