International Journal of Pharmaceutical Science and Research
www.pharmacyjournal.net
ISSN: 2455-4685
Received: 10-10-2021, Accepted: 25-10-2021, Published: 11-11-2021
Volume 6, Issue 4, 2021, Page No. 1-5

A review- study on phytochemical and neuropharmacological effects of *Cassia tora* flowers

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Abstract
Cassia tora flowers family-Leguminosae / Fabaceae has great medicinal properties and used to treat various diseases. Flowers racemes terminal, oblong to rounded corymbose sepals5.petals 5, yellow, perfect stamens 6-7.Contains chemical compounds like: Anthraquinoness, chrysophanol, emodine, rhein, euphol, basseol, iso-istearic, palmatic, behenic acid etc., all chemicals isolated from this plants drugs that effects the nervous system and its functioning, within the brain.there are still no effective therapies Neurological related problems are so common today, that approximately 18% population suffer from disorders each year. These disorders produces serious health problems like behavioral / cognitive syndrome, sleep disorders, peripheral disorders, epilepsy, neurodegenerative disorders, Parkinsonism, neoplasm and many others. Parts of *Cassia tora* are used as an antifungal, antihelmintic, diuretic, expectorant, and laxative, treatment of glaucoma, hypertension, and treatment of skin diseases, ringworm and itch. Pharmacological and phytochemical studies of flowers part of Cassia Tora plants which have been done in different parts.

Keywords: phytochemical and neuropharmacological effects, cassia tora

Introduction
Medicinal herbs constitute the corner stone of traditional medicinal practice worldwide. These herbs are relatively cheap and easily available. These medicinal plants represent a great deal of untapped reservoir of drugs and the structural diversityof their component molecule makes a valuable source of novel lead compounds. The world health organization about 80% of living organism like: Human, developing countries almost exclusively on traditional medicines for first health care needs. The present review traditional medicines uses and recent studies on the active isolated compounds. The hole plants as well as specific parts like: Roots, Leaves, Seeds and Flowers have been widely used in Indian and south Asian medicine it is an annual monsoon weed prevalent in wastelands having many antimicrobial properties, have the problem of pollution and health hazards of conventional agro chemical in view deals with conducted to test its seeds extract against the common aerial fungus, soil fungus and root fungus in forest eco-systems. Furthermore, about 80% of the world population is dependent on plant-based drugs (WHO, 1996). In Nigeria and most developing countries of the world, rural and urban dwellers, literate or illiterate rely heavily on herbal preparations for the treatment of various diseases despite the availability of orthodox medicinethe alternate system of medicine like Ayurveda, Sidda, Unnani, and other tribal folklore medicines have significantly contributed to the health care of population of India. Today, these systems are not only complementary but also competitive in the treatment of various diseases. Initially the materials employed in these traditional medicines were almost botanical origin.

Materials and Methods
Materials
Drug
Ibuprofen
Pentazocine
Chlorpromazine
Valproic acid, Diazepam

Plant: The fresh leaves of Cassia tora
Reagents: Benedict's reagent.
Barfoed's reagent.
Million's reagent
Dragendroff's reagent.
Hager’s reagent
Mayer's reagent.
Wagner's reagent

Chemicals
Petroleum ether
Chloroform
Ethanol

Instruments
- Eddy’s hot plate- Medicraft Pvt. Ltd, Ambala A-10-042 Whole Board
- Soxhlet apparatus-Biotechnics, India. Double distillatory-Infusil-India Pvt. Ltd. Bangalore. (Mark 2000 DDQ-X2) Electronic weighing balance-Citizen scale, India Oral feeding needle- Space Lab, Nasik

Plant profiele
Botanical Name: Cassia Obtusifolia
Synonym: Cassia tora, Senna Obtusifolia

Family: Leguminosae
Vernacular name: Panwar, Penwaad, Sanjsaboya, Sangsaboya, Taarutaa, Ringworm plants, foetidecassia etc.

Common (Indian) names
Hindi: Charota, Chakwad, Chakavat.
Bengali & Oriya: Chakunda
Guajarati: Kawaria
Canarese: Gandutogache
Malayalam: Chakramandrakam, takara
Marathi: Takala

Fig 1

Methodology
The flowers of *Cassia tora* are collected and shade dried. Coarse powder is made from these dried flowers and subjected to extraction in increasing polarities. Various extracts are prepared by using suitable solvents like petroleum ether, chloroform, alcohol and aqueous solvent. Each crude extract obtained after evaporating the solvent subjected to preliminary phytochemical screening and these extracts are utilized for neuropharmacological activity. Stock solution of formulation under study was prepared freshly, on the day of experimentation using distilled water. The dose of formulation-500mg/kg, was selected for the study, the selected doses represent 1/4 of 2000mg/kg. Healthy, Albino Swiss mice- the chosen experimental animals were maintained in our animal house (12:12 dark: light cycle), with adequate ventilation, hygienic conditions maintained on normal palliated diet and water *ad libitum.* A group of six animals were housed in polypropylene cage of 26 X 19 X 13cm on paddy husk bed and covered with stainless steel wire mesh 28 X 20.5 cm with provision for water and feed. Healthy, Albino Swiss mice, of either sex (unless otherwise specified) weighing between 18-25 gm. were employed for study. All experiments were performed in research lab all parameters of different tests were observed and recorded by person blind to treatment protocol. For all experiments, group refers to group of six animals (n=6).Data generated from various experimental procedures were analyzed for statistical significance followed by Dennett's multiple comparison tests.

Successive solvent extraction
The powdered material was subjected to batch extraction in Soxhlet apparatus. The solvents used were petroleum ether, chloroform, alcohol and. distilled water. The powdered material of Cassia tora leaves were evenly packed in a Soxhlet extractor for extraction for about 36 hours with different solvents.

Preliminary photochemical investigation of extract
Qualitative chemical tests were conducted forPetroleum ether, ethanolic, Chloroform and aqueous extracts of flowers of *Cassia tora* to identify the various phytoconstituents. The phytochemical investigation showed presence of flavonoids, saponins, carbohydrates, starch, gum, proteins, tannin and phenolic compounds.

Tests for carbohydrates: Molisch's test (General test)
For reducing sugars: Fehling's test, benedict's test
Test for monosaccharide's: Barfoed's test
Tests for non-reducing sugars: *1.*Test solution do not give response to Fehling's and Benedict's test.*2.*Tannic acid test for starch: With 20% tannic acid, test solution was observed for precipitate
Tests for proteins: Biuret test,Millon's test, Xanthoprotein test, Test for protein containing sulphur, Precipitation test,
Tests for Steroids: Salkowski Reaction, Liebermann-Burchard Reaction
Tests for amino acids: Ninhydrin test, Test for Tyrosine, Test for tryptophan
Tests for flavonoids: Shinoda test, Ferric chloride test
Tests for alkaloids: Dragendroff's test, Mayer's test, Hager's test, Wagner's test
Tests for tannins and phenolic compounds: To 2-3 ml test solution, added few drops of following solutions and was looked for respective colouration or precipitate

a. **5% Ferric chloride solution:** Deep blue-black coloured.
b. **Lead acetate solution:** White precipitate.
c. **Gelatin solution:** White precipitate.
d. **Bromine water:** Decoloration of bromine water.
e. **Acetic acid solution:** Red colour solution.
f. **Potassium dichromate:** Red precipitate.

Tests for Vitamins: Test for Vitamin A, Test for vitamin C (Ascorbic acid), Test for Vitamin D
Tests for glycosides: General test for Glycosides-Part A: To 2-3 ml of extract dil H_2SO_4 was added and heated on a water bath for 1-2mins. Neutralise with 10% NaOH, check with litmus paper and to resulting solution add Fehling's A and B. Increased red precipitate in this case shows glycosides are present. Part B: To 2-3 ml of extract, water was added and heated. According to need, NaOHwas added for neutrlaisation and also added equal quantity of water. To the resulting solution added Fehling's A and. Increased red precipitate in this case showed glycosides are absent.
Tests for Cardiac Glycosides: Baljet's test, Legal's test (For cardenoloids), Test for deoxysugars (Kellar Killani test), Libermann's test (For bufadenolids)
Tests for saponin glycosides: Foam test, Haemolytic test

Pharmacological Investigation
Acute (ORAL) toxicity study (Acute oral toxicity Fixed dose Procedure, FDP)
Acute oral toxicity study for the proprietary formulation was carriedoutusing OECD/OCED guideline 420 (modified adopted 23rd march 2006).The test procedure minimizes the number of animals required to estimate the oral acute toxicity of a chemical and in addition estimation of LD_{50}, confidence intervals. Thetest also allows the observation of signs of toxicity and can also be used to identify chemicals that are likely to have low toxicity.

Principle of the FDP

The fixed dose procedure is method for assessing acute oral toxicity that involve the identification of a dose level that cause evidence of non-lethal toxicity(termed evident toxicity) rather than a dose level that cause lethality. Evident toxicity is a term describing clear signs of toxicity following administration of test substance, such that an increase to the next highest fixed dose would result in the development of severs toxic signs and probably mortality.

Procedure

Healthy, young adult Albino Swiss mice (18-25gm), nulliporous and non-pregnant were used for this study Food, but not water was withheld for 3-4 hours and further 1-2 hours post administration of sample under study Fixed dose level of 5, 50, 500 mg/kg were initially chosen as dose level that would be expected to allow the identification of dose producing evident toxicity. During the validation procedure, a fixed dose of 2000mg/kg was added to provide more information on substance of low acute toxicity

Observation

Animals were observed individually at least every 5 minutes once during first 30 minutes after dosing, periodically at 2hrs during the first 24 hours (with special attention during the first four hours) and daily thereafter, for a total of 14 days

Results

Table 1: Percentage yield, colour, consistency and solubility in water of different extracts

Plant part used	Extracts	Percentage yield	Color	Consistency	Solubility in Water
Cassia tora leaves	Petroleum	2.08	Dark green	Sticky	Insoluble
	Chloroform	1.95	Dark green	Sticky	Soluble
	Ethanol	1.96	Dark green	Sticky	Highly soluble
	Aqueous	2.13	Dark brown	Dry powder	Highly soluble

Preliminary Phytochemical Screening of *Cassia tora*

Table 2

Phytocheical constituents	Pet ether	Chloroform	Ethanol	Aqueous
Alkaloids	-	+	+	+
Glycosides	-	++	++	++
Carbohydrates	-	+	+	+
Flavonoids	-	+	+++	+++
Saponins	-	+	+++	+++
Tannins	-	+	+++	+++
Steroids	-	-	++	++
Proteins	+	+	+	+
Fats and oils	++	-	-	-
Starch	-	-	++	++
Gums	-	-	+++	+++
Phenolic compounds	-	-	+++	+++
- absent	++more clarity			
+ indicates	+++ better response			

Neuropharmacological Study

Effect of EEC and AEC on exploratory behavior in mice

Table 3

S. no	Groups	Dose(mg/kg)	No.of Head dip
1	Control	-	19.2±1.12
2	Chlorpromazine	1	6.33±0.66 [c]
3	EEC	500	9.17±7.45[a,d]
4	AEC	500	10.83±1.95[a,d]

All values are mean±SEM, (n=6), [a]$P<0.05$, [c]$P<0.001$, when compared with control. [d]$P<0.05$ when compared with standard.

Effect of EEC and AEC flowers on exploratory behavior in mice (Percentage inhibition)

Table 4

Sr. no.	Groups	Dose(mg/kg)	No, of head dip	Percentage inhibition
1	Control	-	19.2±1.12	-
2	Standard (Chlorpromazine)	1	6.33±0.66[c]	67.03.52
3	Ethanolic extract	500	9.17±7.45[a,d]	52.23
4	Aqueous extract	500	10.83±1.95[a,d]	43.59

Effect of EEC and AEC leaves on exploratory behavior in mice

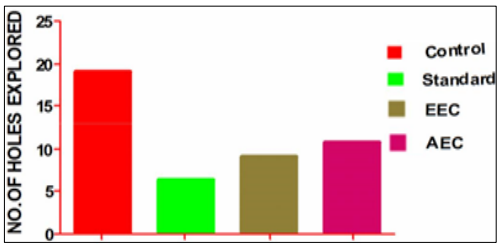

Fig 2: Treatment

Effect of EEC and AEC on diazepam induced sleeping time

Table 5

Sr.no.	Groups	Dose (mg/kg)	Onset of action (min)	Duration of action (min)
1	Control(Diazepam)	5	121.8±5.5	83.00±2.04
2	EEC+Diazepam	500	83.83±2.15[b]	114.7±3.48[b]
3	AEC+Diazepam	500	54.00±1.65[b]	126.0±1.92[b]

all values are mean±SEM, n=6, [b]$P<0.001$, when compared with control

Effect of EEC and AEC on diazepam induced sleeping time

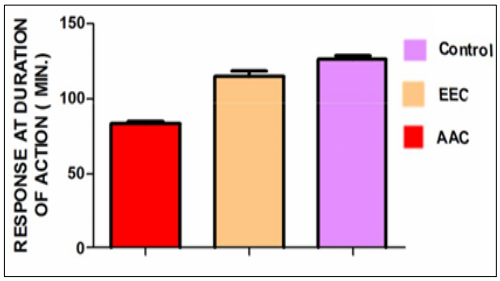

Fig 3: Treatment

Effect of EEC and AEC on maximal electroshock (MES) method graph

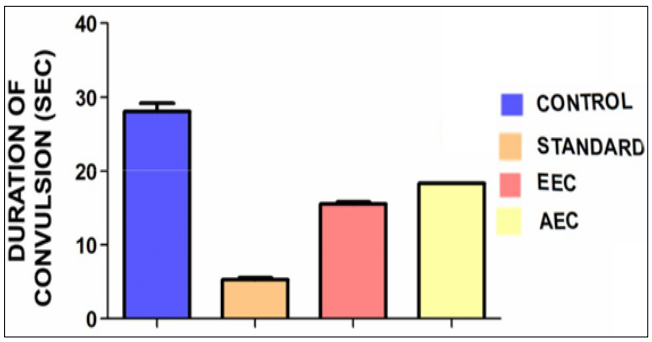

Fig 4: Treatment

Conclusion

The present work suggests that it requires isolating and characterizing the active components responsible for the neuropharmacological activities and further studies to reveal the exact mechanisms of action responsible for the neuropharmacological activities of *Cassia tora* flowers. Both the extracts EEC and AEC at the dose 500mg/kg body weight along with valproic acid at the dose 300mg/kg body weight showed significant reduction in time to recover from electrically induced convulsions in mice when compared with control group (15.52±0.22, 18.33±0.16 and 28.17±1.01, P<0.001, P<0.001 and P<0.001).The sedative-hypnotic effect of EEC and AEC was assessed using diazepam induced sleeping time. The preliminary phytochemical evaluation of different extracts of *cassia toraflowers* revealed the presence of flavonoids, carbohydrates, starch, gum, proteins,tannins, saponins and phenolic compounds. The results of phytochemical analysis were significant in ethanolic and aqueousextracts when compared with petroleum ether and chloroform extracts. In the present study effect of EEC and AEC on various parameters like exploratory behavior, analgesic activity, sleeping time and anti-convulsion activity was studied to expose the neuropharmacological property in different animal models.

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