

## CATHARTIC ACTIVITY OF CASSIA SPECIES

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### ABSTRACT

Cathartic activity of the three him. species i e. *Cassia angustifolia*, *C. holosericea* has been assessed by Lou's methods. Comparative. study revealed that *C. angustifolia* is more active as compared to *C. fistula* and *C. holosericea*. Furthermore, the comparative study of their Sennoside content also supports the above finding, as they bear some correlation between Cathartic activity and Sennoside contents. The legumes of all the three species were found to be more active as compared to leaves in their Cathartic activity.

### Introduction

Genus *Cassia* belongs to the family *Leguminosae*, having more than 400 species. This genus is distributed all over India, Pakistan, Cylon, Malaysia, China and South Africa (Chopra, I.C 1958; Jafri, S.M.H. 1966; Nadkarni, K.M. 1954 and Kirtikar, K.R. *et. at*, 1935).

Cathartic, activity was assessed in leaves and pods of many *Cassia* species (Goodman and Gillman, 1980; Kisa, K. *et. at*, 1981; Fairbarin, J.W. *et. at*, 1951; Iyengar, M.A. *et. at*, 1966; Nakajima, K. *et al*, 1985 and Albert, R. *et. at*. 1952). *Cassia holosericea* is a new species. No detailed study regarding its activity and chemical composition is available. The chemical analysis of *C holosericea* carried out by (Yasmeen, A. *et. al*, 1985, 1986) indicate that its chemical study is more or less same as of other *Cassia* species. Therefore it was decided to study the three species of *Cassia*, i.e. *C. angustifolia*, *C. fistula* and *C. holosericea* for their Cathartic activity. The three species of *Cassia* are identified from one another on the basis of their morphological characteristics as described below:

- C. angustifolia* Vahl. (Syn. *C. lanceolata*, Vern. sonna makki as described by Jafri, S.M.H., 1966) is a less hairy pernnial, having yellow flowers and pods, 2-3cms long and contain 5-7 obvate dark brown and nearly smooth seeds.
- C. fistula* Linn. Vern. amaltas is a small tree with leaflets having yellow flowers and pods, 30-50cms long.
- C. holosericea* (Jafri, S.M.H., 1966) Vern. Jangli Senna is a pernnial with yellow

flowers and pods, 2-2.5cms long.

Cassia species are well known for their medicinal and therapeutic importance since ages and are still being extensively used in many pharmaceutical preparations. The preparations *Confectio Senna* and *Pulv. glycyrrhizae* are two of the popular remedies of the Pharmacopoeia (Chopra, I.C., 1958; Goodman and Gillman, 1980). The drug has been known to Arabs for many centuries and it is believed that it was introduced into Indian and European medicine through them. Even today the Arabs extol the merits of Senna as a purgative. Cassia species are extensively used in eliminating skin infections. This activity is related to the presence of Chrysophanic acid which is a main constituent of Cassia species (Kirtikar, K.R., 1935 and Shah, C.S. *et. al.*, 1968). Cassia species are also found to damage sarcoma 37 or we can say that they have a tumour damaging property (Belkin, M. *et. al.*, 1952). But the most important use of this genus is as purgative or laxative (Kisa, K. *et. al.*, 1981; Fairbarin, J.W. *et. al.*, 1951; Iyengar, M.A. *et. al.*, 1966; Nakajima, K. *et. al.*, 1985; Albert, R. *et. al.*, 1952; Richard, W. 1942; Albert, R.L. *et. al.*, 1952) beside varied medicinal uses.

The purgative action is supposed to be due to the presence of Cathartic acid, Aloe emodine, (Anthraquinone) and Chrysophanic acid. The other common constituents present in Cassia species under study are volatile oils, waxes, resinous substances, flavons, mucilaginous substances and sugars (Shastari, M.S., 1965 and Lilly, K.L., 1968). Senna pods from Sudan have more sennoside contents as compared to Indian Senna (International Trade Centre, UNCTD/GATT 1982).

Quantitatively an assay of sennoside is taken as a measure of purgative activity (Kissa, K. *et. al.*, 1981; Nakajima, K. *et. al.*, 1985 and Rawson *et. al.*, 1965). Literature citation reveals that those species of Cassia which are rich or have high content of tannins do not exhibit any cathartic activity. Furthermore cathartic activity in case of cassia species increases on storage. Leaves and pods of Cassia should be protected from light and moisture, kept clean, hygienic, fumigated and protected against insects and rodents (International Trade Centre, UNCTD/GATT 1982), while on the other hand it is also reported that more activity is found in fresh green pods (Kirtikar, K.R. *et al.*, 1935).

### Materials and Methods

The leaves and pods of the three species of Cassia were collected from the surroundings of PCSIR Laboratories and Karachi University. The collected samples were washed, dried and then powdered for further use. Powdered material was kept in dried, colored and airtight containers.

#### *Estimation of Sennoside*

Sennoside contents of three species of Cassia was estimated by methods as described by Lemali, 1965. (Results are shown in Table I).

## Results and Discussion

**Table-I: Total Sennoside Content of Cassia species**  
(Yasmeen, A., et. al, 1986)

Sr. No.	Name of plants	Parts of plant used	Total Sennoside content (%)
1.	Cassia angustifolia	leaves	2.9592
	(Sunna makki)	legumes/pods	5.1030
2.	Cassia fistula	leaves	1.2055
	(Amaltas)	legumes/pods	1.1437
3.	Cassia holosericea	leaves	1.3971
	(Jangli henna)	legumes/pods	0.8494

### Chronic Toxicity

Chronic toxicity test was carried out on rats (males and females) by feeding the powdered drug in a dose of 1250mg/body weight in their daily diet for 28 days as shown in Table-II. Care was taken not to feed or to give any other food or water after 2 hours of drug. Time of feeding the drug was kept constant during the observation period. Observations were made daily. After 28 days animals were sacrificed and observed for any untoward effect.

**Table-II: Toxicity Test**

Sr. No.	Name of Plant or Drug	Part Used	Common Name	Source of availability	No. of test animals		Dose/ animal in mg.
					Male	Female	
1.	Cassia angustifolia	Leaves	Sonna makki or Senna	Karachi PCSIR Labs.	8	8	1250.00
		Legumes			8	8	1250.00
2.	Cassia fistula	Leaves	Amaltas	"	8	8	1250.00
		Legumes			8	8	1250.00
3.	Cassia holosericea	Leaves	Jangli Senna	"	8	8	1250.00
		Legumes			8	8	1250.00

*Cathartic activity*

For assessing Cathartic activity different methods are given in the literature. In general it may be stated that these methods are based either on the distance passed or travelled by the intestinal contents in a delinate time, due to the administration of drug or on the defecation of unformed or wet stools. As suggested by Iyengar, M.A., *et.al.*, 1966 and Lou, T.C. 1949 and many others to use the drug in powdered form directly rather than its infusion. Therefore in these experiments powdered form of the drug was used. Louis (Iyengar, M.A. *et. at*, 1966) method was used for testing. In this method Unformed Feaces (U.F) were taken into account to the proportion of Total Feaces (T.F) during a fixed interval of time. Healthy rats of both sex weighing 250-300 gms of same age were taken. They were divided into different groups. Each group consisted of eight animals (Males and Females). Groups for testing were made as described in Table-III, while selecting animals care was taken to avoid rats which were found to be predisposed for diahrrhoic conditions or were suffering from diarrhea used for experimentation were thoroughly cleaned washed and dried before the admistration of drug. Filter paper shoats were fixed properly in the dropping trays final observation of feacal matter. Dry powdered drug of both leaves and legumes a dose of 312.5mg; 1250mg per animals per day was mixed in their daily diet. Care was taken not to administer any water or food

Table-III: Dose (mg) for the Assessment of Cathartic Activity

Sr. No.	Name of Plant	Common Part		No. of animals		Dose in mg.	Time of observation
		Name	Used	M.	F.		
1.	Cassia angustifolia	Sonna makki	Leaves	8	8	312.5	8 hours
				8	8	625.00	8 hours
				8	8	250.00	8 hours
			Legumes	8	8	312.5	8 hours
				8	8	625.00	8 hours
				8	8	1250.00	8 hours
2.	Cassia	Analtas	Leaves	8	8	312.5	8 hours
				8	8	625.00	8 hours
				8	8	1250.00	8 hours
			Legumes	8	8	312.5	8 hours
				8	8	625.00	8 hours
				8	8	1250.00	8 hours
3.	Cassia holosericea	Senna'	Leaves	8	8	312.5	8 hours
				8	8	625.00	8 hours
				8	8	1250.00	8 hours

before and after 2 hours of administration of drug. Normal feed was given to animal avoiding large quantities of water. Observations were made and recorded from the time of administration of drug to 8 hours after. The stools which stained the filter paper were counted as unformed (U.F) stools and those which did not stain the filter paper were taken as formed stools. Time of onset of Cathartic action after the administration of drug was recorded. From the average data of each group percentage of unformed (UF) stools was calculated. All experiments were repeated ten times to confirm the results.

Total sennoside contents of the three species of Cassia are summarized in Table-I. Results indicate that Cassia angustifolia or Senna makki is rich in Sennoside content both in leaves and legumes. Its sennoside content are almost double as compared to other two varieties while in case of Amaltas and laugh Senn, sennoside contents are more or less equivalent in leaves but they differ in case of pods/legumes.

Powdered drug of all the three species of Cassia under study was fed to rats for 28 days. It was noticed that the drug showed a positive laxative action after 6 hours of feeding during the first five days. This time was gradually reduced to 3.30 hours and finally the rats were passing loose stools. Furthermore it was observed that the long term administration of the drug rendered the animal, dull, drowsy and lethargic. There is definite loss of weight as shown in Table-IV. Weight reduction was more in case of females than in males, further more it was observed that the animals which were given legumes showed marked reduction of weight than those which were fed on leaves as it is clear from Table-IV. There was a marked increase in their urine volume which indicates that Cassia species under test have a defenate diuretic action. This action has been reported in *C. occidentalis* (Rhode, N.K. *et al*, 1957), which increases the urine volume 300 times. Autopsy finding reveals that the liver was damaged. Inflammation of small intestine was seen and was a common feature. Dark yellow coloration was common in the intestine of all the animals. This may be due to the anthraquinone present in the plants. No damage was caused or done to the intestinal tissues. Work by Dufour, P. *et. al*, 1984 confirms the finding that long term administration of anthraquinone derivatives do not damage the intestinal tissues, but they do bring about number of changes in the intestinal tissues, nervous tissues, mainly in the form of vacuolisation of the axon formation of lysosomal structure and appearance of fibrillar degeneration.

For the assessment of Cathartic activity Lou's method (Iyengar, M.A. *et. al*, 1966) was adopted. Three different doses of Cassia species were given to test animal.



Cathartic activity was more in *Cassia angustifolia* while in both *C. fistula* and *C. holosericea* activity was same. Rate of activity was found to be more in females than in males. It was further observed that the purgative action does not depend upon the dose or their is no proportion at all with different doses of the drug given as shown in Table-V. Action usually starts after 6 hours of administration of drug and lasts for 2 hours.

Table-V: Cathartic Activity

Name of Drug	Obs. time in hrs.	Dose in mg.	Leaves				Legumes							
			Total No. of (U.F)		% of UF to TP		Total No. of (T.F)		% of UF to TP					
			Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<i>C. angustifolia</i>	8 hrs.	312.50	59	72	12	17	20.33	23.61	69	73	17	21	24.63	28.76
		625.00	77	85	22	27	28.57	31.76	73	81	23	29	31.50	35.80
		1250.00	67	75	34	40	50.74	53.83	89	90	49	51	55.05	56.66
<i>C. fistula</i>	8 hrs.	312.50	73	8	13	15	17.80	18.51	97	67	19	14	19.58	20.89
		625.00	87	95	30	22	22.98	23.15	107	75	29	21	27.10	28.00
		1250.00	88	103	33	39	37.5	37.86	91	79	37	33	40.65	41.77
<i>C. holosericea</i>	8 hrs.	312.50	63	70	11	15	17.46	18.98	84	73	16	14	19.04	19.17
		625.00	70	83	16	19	22.85	22.89	91	79	25	22	27.47	27.84
		1250.00	85	97	32	36	37.64	37.11	95	88	39	39	41.05	42.04

Note: T.F. = Total Faeces  
U.F. = Unformed Faeces

During This observation period it was noticed that animals passed partly "Wet stools" known as Unformed Stools (U.F) and partly solid stool known as Formed Stools (ES). The two stools were differentiated from one another on the basis of staining the filter paper.

Difference in the type of formation of stool was also observed in all the three species of *Cassia*. The animals which were given *C. angustifolia* excreted stools which were unformed and were staining the filter paper sheet badly while the stools excreted by the other two species were soft and elongated. They also stained the filter paper but not to that extent as in case of *C. angustifolia*. Chemical estimation of sennoside present in both the plants. *C. fistula* and *C. holosericea* are more or less same in leaves and legumes. This also gives us a faint idea that the Cathartic activity of both the plants will be same. It was also observed that the rate of urine excretion was also increased. The amount of urine excreted was almost more than double.

Being a natural vegetable product variation in their activity is always present which depends on many factors. Cathartic values obtained in one species will not remain same because first of all potency increases on storage. Fresh samples of *Scrum* will not give the same result as the old one's (Iyengar, M.A. et. al, 1966). In this experiment all samples were fresh. The variations may also be attributed due to various ecological factors also.

As whole plant in powdered form is used. Rhein (Nakajima, K., et. al, 1955) is also present in the plant. Many research workers worked on Rhein which was also found to have positive Cathartic effect but to a lesser strength. Being natural product plants contain cellulose, sugars, organic matter, which when enter the body swell in the intestinal fluid. They not only facilitate the passage of the intestinal contents, but also act

on the intestine by exciting or increasing peristalsis without affecting the function of the stomach or duodenum. The action depends on the amount of free hydroxyanthraquinones and the ease of decomposition of the glycosides.

### Conclusion

In the end it is concluded that the Cathartic activity of the three species under study do not differ much. The activity is enhanced in legumes as compared to leaves. Further more the comparative study of the sennoside content of the three species as mentioned before seems to have a correlation with the Cathartic activity under study.

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