

Experimental evaluation of analgesic property of bark skin of *Saraca indica* (Ashoka) and *Shorea robusta* (Shal)

Poonam S. Mohod¹, C. R. Jangde², S. D. Narnaware³, Subhash Raut⁴

¹Associate professor, Department of Shalyatantra, Rajiv Gandhi Ayurved College, Shahpura, Bhopal.

²Professor and Dean, Nagpur Veterinary College, Seminary Hills, Nagpur.

³Scientist, National Research Centre on Camel, Jorbeer, Bikaner.

⁴Professor and Head, Department of Shalyatantra, Government Ayurved College, Sakkardara square, Nagpur.

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ABSTRACT

The aqueous and alcoholic extracts of bark skin of *Saraca indica* (Ashoka) and *Shorea robusta* (Shal) were evaluated for their analgesic activity in Swiss albino rats by making use of different pain models such as, tail immersion test, tail clip method and writhing induced by 4% NaCl solution. The aqueous and alcoholic extract of *Saraca indica* and *Shorea robusta* showed significant analgesic activity at 300 mg/ Kg body weight in Swiss albino rats as compared with control rats from physical, thermal and chemical stimulus of evaluation techniques. The analgesic activity might have been attributed to the presence of alkaloids, steroids in these plants as revealed from phytochemical analysis. On the basis of these observations it was concluded that Ashoka and Shal has got analgesic property, however further experimental as well as clinical evaluations are necessary.

INTRODUCTION

Analgesia has got the utmost importance in the success if any surgery and parasurgical procedures. In Ayurvedic texts a number of herbs as well as various parasurgical measures regarding analgesia have been vividly described. *Shorea robusta* (Shal) and *Saraca indica* (Ashoka) are important traditional Indian medicinal plants used in various ailments and rituals and the indigenous use of these plants as a medicament for treatment of various inflammatory conditions is well documented in literature. *Shorea robusta* (Shal) belongs to the family Dipterocarpaceae (two-winged fruit), which is most commonly found in Indonesia, but can also be seen in Malaysia, the Philippines and certain parts of Northern India (Wani *et al.*, 2012). The powdered stem, bark or bark paste is applied to stop bleeding and promote healing of cuts among the tribal inhabitants of southern Bihar and the Kondhs of south-western Odisha, India (Ganesan *et al.*, 2006). Ashoka is the most ancient tree of India, generally known as “shok briksh”, having botanical name *Saraca asoca* (Roxb.), De.wild or *Saraca indica* belonging family *Caesalpinaceae*. *Saraca indica* is used as

spasmogenic, oxytocic, uterotonic, anti-bacterial, anti-implantation, anti-tumour, anti-progestational and having antiestrogenic activity against menorrhagia (Pradhan *et al.*, 2009). In view of the above medicinal importance the aqueous and alcoholic extracts of bark skin of *S. robusta* and *S. indica* were evaluated for their analgesic activity by making use of different physical, thermal and chemical pain models in rats.

MATERIALS AND METHODS

Plant material

Pure barks of *S. robusta* were obtained from Botanical Garden, Suryamukhi Dinesh Ayurved Medical College and Hospital, Ranchi, Jharkhand and pure bark skin of *S. indica* were obtained from Botanical Garden of SNA Oushadhasala, Thissur, Kerala.

Preparation of extract and phytochemical analysis

The alcoholic and aqueous extracts were prepared by the method described by Rosenthaler, 1930. Qualitative analysis of alcoholic and aqueous extracts for the presence of various medicinally important active phytochemicals was carried out as per the methods described earlier (Trease and Evans, 1983).

* Corresponding Author

Dr. S. D. Narnaware, Scientist, National Research Centre on Camel, Jorbeer, Bikaner. email: drshirish009@gmail.com

Experimental animal

Thirty six healthy Swiss albino rats weighing between 200-300 grams were divided in six groups. Each group comprised of six rats with 50% sex ratio (Table 1). The experiments were carried out in accordance with the guidelines of Animal Ethics Committee, Nagpur Veterinary College, Nagpur.

Table. 1: Experimental groups

Group	Extract	Dose	
T1	Distilled water	0.5 ml/ rats	control
T2	Alcoholic extract of <i>Shorea robusta</i>	300 mg/ kg	
T3	Aqueous extract of <i>Shorea robusta</i>	300 mg/ kg	
T4	Alcoholic extract of <i>Saraca indica</i>	300 mg/ kg	
T5	Aqueous extract of <i>Saraca indica</i>	300 mg/ kg	
T6	Analgin	10 mg/kg	standard

Experimental procedure

Models for assessing analgesic activity

The analgesic tests were carried out by the method described by Ghosh (2005).

Tail immersion test

The water was taken in a beaker and heated up to 55-60 degree and temperature was monitored with thermometer continuously. The rats were held in a suitable position with tail protruding out. The tail up to 5 cm was dipped in a beaker containing water at 55± 0.5°C. The time taken in seconds to withdraw the tail clearly out of water was taken as the reaction time.

Thus the initial time in seconds before administration of drug for all rats from each group was recorded. The aqueous and alcoholic extracts of *Shorea robusta* and *Saraca indica* were administered to the groups keeping oral route constant for every administration. The reaction time in seconds was then recorded after administration of drug at the interval of 45 minutes, 75 minutes, and 150 minutes of all groups individually. Mean of these readings was taken as reaction time which was compared with the control group.

Tail clip method (Bianchi and Franceschini, 1954)

In this method, an artery clip with rubber sleeves was applied to the base of rat's tail for 30 seconds. Control rats made continuous efforts to dislodge the clip by biting it the pressure exerted by the clip was so adjusted that it was just sufficient to make all control rats to respond.

Analgesics made the mice indifferent to the clip. The aqueous and alcoholic extracts of *Saraca indica* and *Shorea robusta* were administered to the groups keeping oral route constant for every administration and 30 minutes later the clip was applied. The time taken in seconds to respond clearly was taken as the reaction time. Thus the initial time in seconds before administration of drug for all rats in each group was recorded. The reaction time in seconds was then recorded after administration of drug at interval of 30 minutes, 45 minutes and 75 minutes of all groups individually. Mean of these three reading was taken as reaction time which was compared with the control group.

Writhing induced by 4% NaCl solution

The writhing test with 4% NaCl in rats is a sensitive and specific test for predicting analgesic activity of a compound in man. It is also useful for examining changes in analgesic activity of drugs during chronic (repeated) administration. Male rats (200 ± 20 g) were injected intra-peritoneally with 1 ml/ kg NaCl. Rats that do not exhibit writhing within 30 seconds were discarded. The onset of writhing is much quicker (30 seconds) than that with phenylquinone or acetic acid, and lasts for a shorter period (about 3 min). The aqueous and alcoholic extracts of *Saraca indica* and *Shorea robusta* was administered to the groups (keeping oral route constant for every administration) 20 to 30 minutes before administering NaCl solution. The animals (rats) showing no response was defined as analgesic positive. The percentage protection at each group was calculated.

No response= analgesic positive

Writhing response = analgesic negative

Statistical analysis

The data was analysed by completely randomised design (CRD) to know the level of significance. Mean and critical difference of all the characters under study were calculated as per standard procedure (Snedecor and Cochran, 1989)

RESULTS

Phytochemical analysis

Phytochemical analysis of both the extracts of Ashoka revealed the presence of tannin, essential oil, terpenoid and steroid. Both extracts of Shal has tannin, resins, terpenoid, and essential oil.

Analgesic activity

The results of tail immersion method, tail clip method and writhing test are given in Table. 2, 3 and 4 and Figure 1, 2 and 3 respectively. The aqueous and alcoholic extract of *Saraca indica* and *Shorea robusta* showed significant analgesic activity at 300 mg/ Kg body weight in Swiss albino rats (P<0.01) when compared with control rats from the above physical, thermal and chemical stimulus of evaluation techniques.

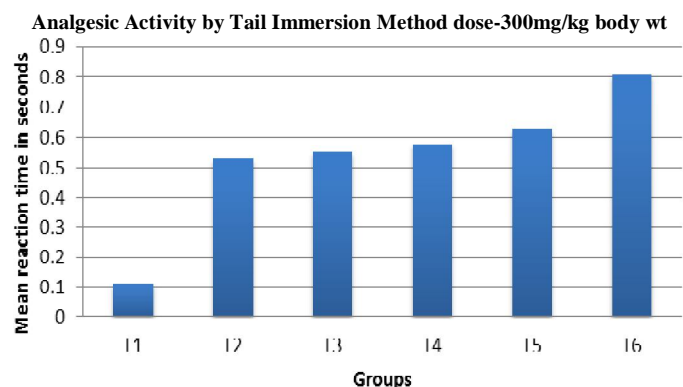


Fig. 1: Bar diagram showing analgesic activity of aqueous and alcoholic extracts of Ashoka and Shal by tail immersion test.

Table 2: Screening of analgesic activity of aqueous and alcoholic extracts of Ashoka and Shal by tail immersion test.

SN	T1			T2			T3			T4			T5			T6		
	BD	AD	Diff.	BD	AD	Diff.	BD	AD	Diff.	BD	AD	Diff.	BD	AD	Diff.	BD	AD	Diff.
1	4.1	4.3	0.2	3.1	3.5	0.4	3.1	3.5	0.4	3.5	4.1	0.6	4.3	4.8	0.5	4.5	5.6	1.1
2	3.3	3.5	0.2	2.6	3.2	0.6	3.6	4.2	0.6	4.1	4.5	0.4	3.7	4.4	0.7	4.2	4.9	0.7
3	3.5	3.6	0.1	2.9	3.3	0.4	2.8	3.4	0.6	3.7	4.6	0.9	2.6	3.5	0.9	3.6	4.4	0.8
4	3.8	3.8	0	2.4	2.8	0.4	3.4	3.9	0.5	3.2	3.7	0.5	4.1	4.6	0.5	3.1	4.1	1.0
5	3.7	3.9	0.2	3.0	3.8	0.8	3.8	4.5	0.7	2.9	3.4	0.5	3.2	3.8	0.6	2.8	3.5	0.7
6	3.5	3.5	0	2.5	3.1	0.6	4.1	4.6	0.5	3.4	4.0	0.6	3.5	4.1	0.6	3.3	3.9	0.6
Mean			0.11			0.53**			0.55**			0.58**			0.63**			0.81**
SD			0.099			0.167			0.109			0.713			0.15			0.914
SE±			0.044			0.075			0.049			0.077			0.067			0.087
t			2.5			7.06			11.22			7.532			9.402			9.31

P<0.01

(BD- Before drug, AD- After drug, Diff-Difference, SE± - standard error, ** - significance)

Table 3: Screening of analgesic activity of aqueous and alcoholic extracts of Ashoka and Shal by tail clip method.

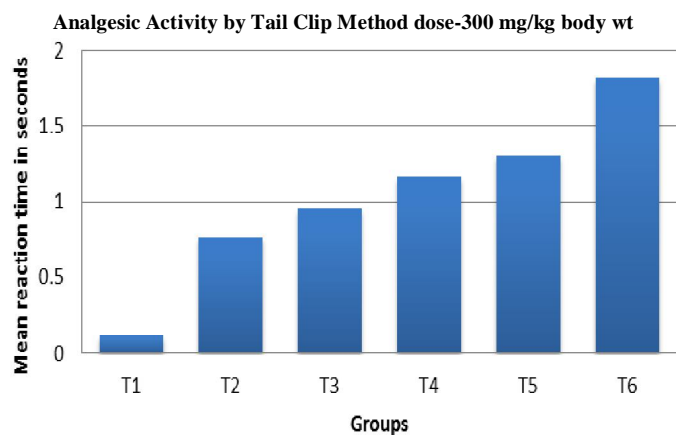
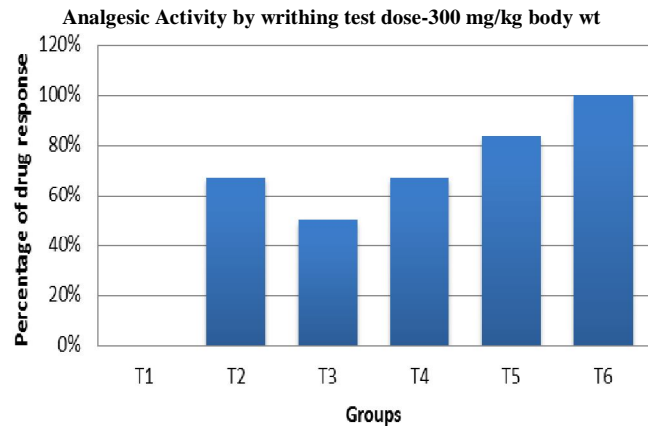
SN	T1			T2			T3			T4			T5			T6		
	BD	AD	Diff.	BD	AD	Diff.	BD	AD	Diff.	BD	AD	Diff.	BD	AD	Diff.	BD	AD	Diff.
1	2.4	2.5	0.1	2.4	3.0	0.6	1.6	2.3	0.7	1.8	2.3	0.5	1.4	3.1	1.7	1.2	3.2	2.0
2	2.0	2.2	0.2	2.1	2.8	0.7	1.5	2.8	1.3	1.9	3.0	1.1	1.3	2.4	1.1	1.4	3.5	2.1
3	1.6	1.8	0.1	2.7	3.2	0.5	1.7	2.5	0.8	2.1	3.0	0.9	1.3	2.9	1.6	1.4	2.8	1.4
4	2.2	2.2	0.0	2.0	3.1	1.1	3.0	3.9	0.9	1.3	3.3	2.0	1.7	2.3	0.6	1.2	3.0	1.8
5	1.8	1.9	0.2	2.0	2.5	2.5	0.5	2.0	2.8	1.7	2.8	1.1	1.8	3.1	1.3	1.5	3.2	1.7
6	1.5	1.7	0.1	1.9	3.1	1.2	1.6	2.8	1.2	1.4	2.8	1.4	1.3	2.8	1.5	1.3	3.2	1.9
Mean			0.116			0.766**			0.95**			1.166**			1.3**			1.81**
SD			0.076			0.309			0.242			0.506			0.404			0.2489
SE±			0.0345			0.138			0.1085			0.226			0.181			0.11
t			3.235			5.674			8.755			5.13			7.18			16.50

P<0.01

(BD- Before drug, AD- After drug, Diff-Difference, DT- Difference total, SE± - standard error, ** - significance)

Table 4: Screening of analgesic activity of aqueous and alcoholic extracts of Ashoka and Shal by writhing test.

S.N.	T1	T2	T3	T4	T5	T6
1	-ve	-ve	-ve	+ve	+ve	+ve
2	-ve	+ve	+ve	-ve	+ve	+ve
3	-ve	+ve	+ve	+ve	+ve	+ve
4	-ve	+ve	-ve	+ve	+ve	+ve
5	-ve	-ve	-ve	+ve	-ve	+ve
6	-ve	+ve	+ve	-ve	+ve	+ve
%	0%	66.66%	50%	66.66%	83.33%	100%

**Fig. 2:** Bar diagram showing analgesic activity of aqueous and alcoholic extracts of Ashoka and Shal by tail clip method**Fig. 3:** Bar diagram showing analgesic activity of aqueous and alcoholic extracts of Ashoka and Shal by writhing test

DISCUSSION

In the various texts of Ayurveda a number of herbs, organic or inorganic drugs have been described that are having analgesic property. Most of these drugs are widely used therapeutically to relieve pain but these drugs needs to be re-established on modern lines. Ashoka and Shal are such herbs which are used very commonly. Ashoka has been mentioned as having analgesic properties in previous studies (Pradhan *et al.*, 2009) which corroborates the finding of the present study. Similarly Shal was also reported to have significant analgesic activity as assessed by using different central and peripheral pain models in a previous study (Wani *et al.*, 2012). The oleoresin exuded from the cut bark reported to have astringent and detergent properties (Wani *et al.*, 2012) and the powdered stem, bark or bark paste is used to stop bleeding and promote healing of cuts among the tribal inhabitants of southern Bihar and south-western Odisha, India (Ganesan *et al.*, 2006). *S. robusta* leaf extract was found to possess significant analgesic activity (Jyoti *et al.*, 2008) and its resin along with some other constituents has also shown potential in wound healing (Datta *et al.*, 2011). The analgesic activity of aqueous and alcoholic extract of *Saraca indica* and *Shorea robusta* can be attributed to the presence of alkaloids and steroids as revealed from phytochemical analysis of the present study.

CONCLUSION

On the basis of observations of the present study it was concluded that bark skin of Ashoka and Shal have got analgesic property, however further experimental as well as clinical evaluations are necessary.

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REFERENCES

- Bianchi C, Franceschini G. Experimental observations on Haffner's method for testing analgesic drugs. *Br J Pharmacol*, 1954; 9: 280–284.
- Datta HS, Mitra SK, Patwardhan B. Wound healing activity of topical application forms based on ayurveda. *Evid Based Complement Alternat Med*, 2011;2011:134378.
- Ganesan S, Venkateshan G, Bhanumathy N. Medicinal plants used by ethnic group Thottianaickans of Semmalai hills, Tiruchirappalli district, Tamil Nadu. *Indian J Tradit Knowl*, 2006; 5:245–52.
- Ghosh MN. 2005. *Fundamentals of experimental pharmacology*. Hilton and Company, Kolkata; 3rd ed. 175- 176
- Jyothi G, Carey WM, RaviKumar B, KrishnaMohan G. Antinociceptive and antiinflammatory activity of methanolic extract of leaves of *Shorea robusta*. *Pharmacolonline*, 2008;1:9–19.
- Pradhan P, Joseph L, Gupta V, Chulet R, Arya H, Verma R, Bajpai A. *Saraca asoca* (Ashoka): A Review. *J Chemical Pharmaceutical Res*, 2009; 1 :62-71.
- Rosenthaler L. 1930. *The chemical investigation of plants*. G.Bell and Sons Limited, London.
- Snedecor GW, Cochran WG. 1989. *Statistical Methods*. 8th ed. Ames: Iowa State Press.
- Trease GE, Evans WC. 1983. *Drugs of Biological Origin*. In: *Pharmacognosy*. 12th ed. United Kingdom: Balliere Tindall. 309-540.
- Wani TA, Chandrashekhara HH, Kumar D, Prasad R, Gopal A, Sardar KK, Tandan SK, Kumar D. Wound healing activity off ethanolic extract of *Shorea robusta* Gaertn. f. resin. *Indian J Experimental Biol*, 2012; 50: 277-281.

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