INTERNATIONAL RESEARCH JOURNAL OF PHARMACY **ISSN 2230 – 8407**
Available online http://www.irjponline.com
Research Article

PRELIMINARY PHYTOCHEMICAL INVESTIGATION AND ANTHELMINTIC ACTIVITY OF *ACACIA SUMA* (ROXB) BARKS

Acharyya Suman[1*], Dash Gauri Kumar[2], Brahma Dillip Kumar[1], Chhetree Rishi Raj[3]
[1]Matushree V.B. Manvar College of Pharmacy, Dumiyani, Rajkot, Gujarat, India
[2]Institute of Pharmacy and Technology, Salipur, Cuttack, Orissa, India
[3]Regional Institute of Pharmaceutical Science and Technology, Abhoynagar, Agartala, West Tripura, India

[*]Matushree V. B., Manvar College of Pharmacy, Dumiyani, Rajkot, Gujarat -360 440 India
Email: sumanjanmenjoy@yahoo.com
Article Received on: 12/12/10 Revised on: 31/12/10 Approved for publication: 16/01/11

ABSTRACT
The present work was conducted to investigate the preliminary phytochemical studies and anthelmintic activities on the bark of *Acacia suma* (Roxb.) Family- Fabaceae against adult Indian earthworms, *Pheretima posthuma.* Various concentrations (5-25 mg/ml) of each extract along with the reference samples (Piperazine citrate, Albendazole) were subjected for anthelmintic activity study. The qualitative test revealed that the petroleum ether extracts contained only terpenoids but chloroform and hydroalcoholic (Methanol 70% v/v) extracts exhibited the presence of carbohydrates, alkaloids, glycosides, flavonoids, tannins and saponins but amino acids and steroids were absent. All the extracts showed anthelmintic activity when compared with petroleum ether and chloroform extracts. The anthelmintic activity of hydroalcoholic extract was comparable with reference drugs.

KEYWORDS: *Acacia suma* (Roxb.), *Pheretima posthuma,* Anthelmintic, Hydroalcoholic, Albendazole, Piperazine citrate

INTRODUCTION
Medicinal plants have served through ages, as a constant source of medicaments for the treatment of a variety of diseases[1]. The history of herbal medicine is almost as old as human civilization. The plants are known to provide a rich source of botanical anthelmintics, antibacterials and insecticides[2]. A number of medicinal plants have been used to treat parasitic infections in man and animals. Parasitic helminthes effect the human beings as well as animals leading to considerable hardship and stunted growth. The parasitic invasion is caused by mixed infections with several species of stomach and intestinal worms. Chemical control of helminthes coupled with improved management has been the important worm control strategy throughout the world. Despite extensive use of synthetic chemicals in modern clinical practices all over the world, interest in exploiting potential use of plants [3] as source of drugs are under study.

Acacia suma (Roxb.) var. *Acacia polyacantha* (Family-Fabaceae) is a medium sized erect tree; trunk with fissured bark and knobby persistent prickles found in the greater part of India and costal districts of Orissa[4,5]. The bark is reported to be used as blood purifier[5] and possesses anti-cancer, insecticide and astringent properties[6-9]. The seeds are reported to have hypoglycaemic effect[6].The leaves and roots of the plant are reported to be use as insecticide, antifungal, antivenin, aphrodisiac, antimalarial, anticrustacean, stimulant and in the treatment of sores, abcesses and asthma[9-15]. Presence of proanthocyanidin[6], 5,4'-dihydroxy-7,3'-dimethoxyflavone-3-0-D galactopyranoside[7,16], gallocatechin-5-7-digallate, quercetin and gallocatechin-7-gallate[8] in the barks have been reported earlier. An extensive literature survey does not reveal anthelmintic activity of bark. So the present study was under taken to investigate the preliminary phytochemical screening and anthelmintic activity of bark of *Acacia suma*.

MATERIALS AND METHODS

Plant Material

The plant material (barks) was collected from the forests of Ganjam district of Orissa during June 2007 and identified by the taxonomists of the Botanical Survey of India, Shibpur, Howrah. A voucher specimen [Sp. No: CNH/ I-I / (17)/2009/Tech.II/28] has been kept in our research laboratory for further reference. After authentication, fresh barks were collected in bulk, washed, shade dried and pulverized in a mechanical grinder to obtain coarse powder. The powder was stored in a dessicator for further use.

Preparation Of Crude Extracts

The powdered mass was exhaustively extracted successively in soxhlet apparatus using solvents like petroleum ether, chloroform and hydroalcohol (methanol 70 % v/v) based on their polarity. Finally extracts were concentrated under reduced pressure using rotary evaporator and stored for further analysis.

Preliminary Phytochemicals Analysis

During preliminary phytochemical screening tests were mainly concluded to alkaloids, carbohydrates, glycosides, saponins, flavonoids, tannins and terpenoids[17,18.] The constituents are reported in Table 1.

Preliminary Anthelmintic Activity Screening

The anthelmintic activity was performed according to the method of Ghosh et al.[19] on adult Indian earthworm *Pheretima posthuma* as it has anatomical and physiological resemblance with the intestinal roundworm parasites of human beings. All the extracts were dissolved in minimum amount of dimethyl sulphoxide and then volume was adjusted with saline water. Three groups were prepared control (saline water), reference samples (piperazine citrate and albendazole at 10 mg/ml and the extracts of (5, 10, 20 and 25 mg/ml). The reference samples and extract solutions were prepared freshly before starting he experiment. Observations were made for the time taken to paralyze or death of individual worms. Paralysis was said to occur when the worms do not receive any sense even in normal saline. Death was concluded when the worms lose their motility followed with fading away of their body color, when dipped in warm water (50^0C). The results are shown in Table 2 depict the time taken for paralysis and death of worms after treatment with the extracts at the selected concentrations.

Statistical Analysis

The data on biological studies were reported as mean ± Standard deviation (n = 6). For determining the statistical significance, standard error mean and analysis of variance (ANOVA) at 5 % level significance was employed. The P values < 0.05 were considered as significant.

RESULTS AND DISCUSSION

Preliminary phytochemical screening indicated the presence of carbohydrates, alkaloids, saponins, glycosides, tannins, flavonoids and terpinoids (Table1). All the extracts showed the anthelmintic activity in dose dependent manner at 5 to 25 mg/ml. The chloroform and hydroalcoholic extracts of *A. suma* revealed significant anthelmintic activity[20-22]. The hydroalcoholic extract shown better paralytic value and death at 10mg/ml than the standards (Fig 1 and 2). The chloroform extract also showed satisfactory results at concentration of 10mg/ml. The presence of alkaloids, glycosides and tannins may be the responsible chemical constituents[23,24] for demonstrating anthelmintic activity. The possible mechanism of tannins may to interfere with energy generation by uncoupling oxidative phosphorylation or they may interfere with glycoprotein of cell surface. It was also possible that alkaloids may act on central nervous system and caused paralysis of the *Pheretima posthuma* worms.

CONCLUSION

It could be concluded and confirmed that the hydroalcoholic extracts of bark of *A. suma* has anthelmintic activity comparable with standard drugs, which is a significant result. Further studies are required to identify the actual chemical constituents that are present in the crud drug extracts of this plant which are responsible for anthelmintic activity[25-27.] It is, however, suggested to conduct further research on pure chemical constituents to critically evaluate their activity on a large number of animals[28,29].

ACKNOWLEDGEMENTS

The authors are thankful to the management of Matushree V. B. Manvar College of Pharmacy, Dumiyani, Rajkot district, Gujarat for providing necessary facilities to carry out the present research works.

REFERENCES

1. Chopra RN, Nayer SL, Chopra IC. Glossary of Indian Medicinal Plants Council of Scientific and Industrial Research. 3rd Edn. New Delhi (India); 1956. p. 7–246.
2. Kala CP, Farooquee NA, Dhar U. Prioritization of medicinal plants on the basis of available knowledge, existing practices and use value status in Uttaranchal, India. Biodiversity and Conservation, 2004; 13: 453-469.
3. The Ayurvedic Pharmacopoeia of India, Part I, Vol. I, Government of India Ministry of Health and Family Welfare; 2004.
4. Kiritikar KR and Basu BD. Indian Medicinal Plants. Lalit Mohan Basu: Allahabad. Vol- II. 1933. p. 935.
5. Anonymous. The Wealth of India. CSIR: New Delhi. Vol- I. 1985. p. 42.
6. P. Gandhi, New proanthocyanidin from stem bark of *Acacia suma.* Experientia. 1977; 33(10): 1272.
7. Rastogi RP and Mehrotra BN. Compendium of Indian medicinal plants. Central Drug Research Institute, Lucknow and Publications and information Directorate: New Delhi. Vol.-II. 1933. p. 4-5.
8. Ayoub SMH. Flavenol molluscicides from the Sudan acacias. Int J. Crude Drug Res. 1985; 23(2): 87-90.
9. Vanpuyvelde L, Geysen D, Ayobangira FX., Hakizamunge E, Nshimiyimana A, and Kalisa A. Screening of medicinal plants of Rwanda for acaricidal activity. J. Ecthnopharmacol. 1985; 13(2): 209-215.
10. Headbarg I, Headberg O, Madati PJ, Mshigeni NK, Mshiu EN and Samuelsson G. Inventory of plants used in traditional medicine in Tanzania II. Plants of the families dilleniaceae-opiliaceae. J. Ecthnopharmacol. 1983; 9(1): 105-127.
11. Almagboul AZ, Bashir AK, Karim A, Salim M, Farouk A and Khalid SA. Patterns of nutrition in Gezira (part 1). Fitoterapia. 1988; 59(5): 393-396.
12. Selvanayahgam ZE, Gnanevendhan SG, Balakrishna K and Rao RB. Anti snake venom botanicals from ethnomedicine. J Herbs Spices Med Plants. 1994; 2(4): 45-100.
13. Gessler MC, Nkunyak MHH, Mwasumbi LB, Heinrich M and Tanner M. Screening of Tanzanian plants for antimalarial activity. Acta. Tropica. 1994; 56: 65-77.
14. Watt JM and Breyer-Brandwijk MG. The Medicinal and Poisonous Plants of Southern and Eastern Africa. E.+S. Livingstone Ltd: London. 1962. p.1455-1457.
15. Massele AY and Nshimo CM. Brine shrimp bioassay for biological activity of medicinal plants used in traditional medicines in Tanzania. E Afr Med J. 1995; 72(10): 661-663.
16. Anonymous. Reviews on Indian medicinal plants. ICMRV: New Delhi. Vol-I. 1963. p. 61.
17. Trease GE and Evans WC. Pharmacognosy. ELBS Publication, Delhi. 1989. p.171.
18. Harborne JB. Phytochemical method: A Guide to modern techniques of plant analysis. Chapman and Hall: New York. 1984. p. 85.
19. Ghosh T, Maity TK, Bose A and Dash GK. Anthelmintic activity of *Bacopa monierri*. Indian J. Nat Product 2005; 21: 16-19.
20. Chaterjee KD. Parasitology, protozoology and helminthology. Sree Saraswati press Ltd, 3rd Edn. Calcutta; 1967.
21. Rastogi T, Bhutda V, Moon K and Aswar PB. Comparative Studies on Anthelmintic Activity of *Moringa oleifera* and *Vitex negundo*. Asian J. Research Chem. 2009; 2(2): 181-182.
22. Mali RG, Mahajan SG and Mehta AA. In vitro anthelmintic activity of stem bark of *Mimusops elengi* Linn. Phcog Mag. 2006; 3(10): 73.
23. Martin RJ. Mode of action of anthelmintic drugs. Vet J. 1997; 154: 11- 34.
24. Anthnasiadou S, Kyriazakis I, Jackson F and Coop RL. Direct anthelmintic effects of condensed tannins towards different gastrointestinal nematodes of sheep: In vitro and in vivo studies. Vet Parasitol 2000; 99: 205-219.

25. Iqbal Z, Nadeem qazi K, Khan MN. *In Vitro* Anthelmintic activity of *Allium sativum, Zingiber officinale, Curcurbita mexicana and Ficus religiosa.* Int. J. of Agr. & Bio. 2001; 3: 454–457.
26. Chemical Investigation and anti-inflammatory activity of *Vitex negundo* seeds, J. Nat Prdt 1992; 55(2): 163-167.
27. Gathuma JM, Mbaria JM, Wanyama J, Kaburia HF. Efficacy of *Myrsine africana, Albizia anthelmintica* and *Hilderbrantia sepalosa* herbal remedies in Samburu district, Kenya. J Ethnopharmcol 2004; 91: 7-12.
28. Waller PJ. International approaches to the concept of integrated control of nematode parasites of livestock. Int. J. Parasitol 1999; 29: 155–164.
29. Akhtar MS. Anthelmintic evaluation of indigenous medicinal plants for veterinary usage. Final Research Report, Dept. Physiol. Pharmacol., Univ. Agri., Faisalabad Pakistan; 1988

Table 1: Preliminary phytochemical screening of different extracts of *A. suma* barks.

Extracts	Alkaloids	Carbohydrates	Glycosides	Gums and mucilages	Proteins and amino acids	Tannins	Steroids and sterols	Triterpenoids	Saponins	Flavonoids
Pet. Ether	-	-	-	-	-	-	-	+	-	-
Chloroform	+	+	+	-	-	+	-	-	-	-
Hydroalcoholic extract	+	+	+	-	-	+	-	-	+	+

(+): Present; (-): Absent.

Table 2: Comparative anthelmintic activity of the extracts with reference samples

Test substances	Concentration(mg/ml)	Time taken for paralysis(min.) (X±SEM)	Time taken for death(min.) (X±SEM)
Control	-	-	-
Pet ether Extract	5	92.04 ± 1.45	137.10 ± 1.89
	10	80.2 ± 2.35	110.76 ± 0.79
	20	65.02 ± 1.64	109.42 ± 0.85
	25	59.55 ± 0.82	99.19 ± 1.72
Chloroform Extract			
	5	79.69 ± 0.96	101.73 ± 1.33
	10	35.86 ± 0.59	95.47 ± 1.43
	20	22.57 ± 1.31	64.33 ± 1.99
	25	12.45 ± 1.28	61.08 ± 1.71
Hydroalcoholic extract			
	5	33.5 ± 0.98	59.78 ± 0.98
	10	31.49 ± 0.8	49.44 ± 0.82
	20	20.92 ± 1.7	40.13 ± 0.92
	25	10.53 ± 0.78	30.78 ± 1.05
Albendazole	10	32.73 ± 1.5	53.71 ± 0.9
Piperazine citrate	10	26.33 ± 1.4	72.67 ± 1.7

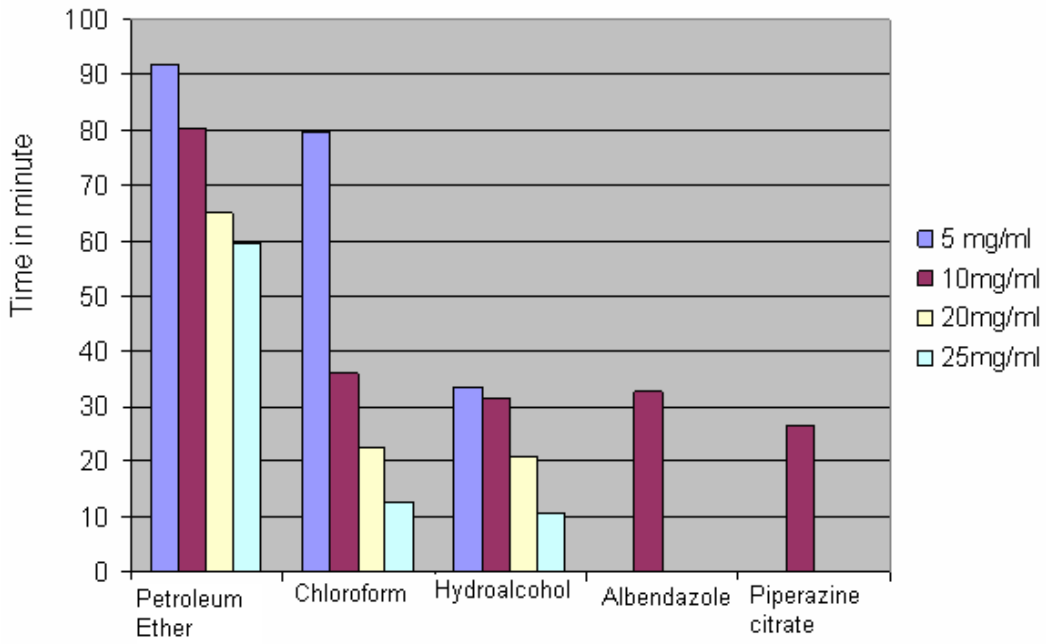

Fig 1: Time taken to paralyze by bark extracts of *A. suma* at different concentrations and reference samples

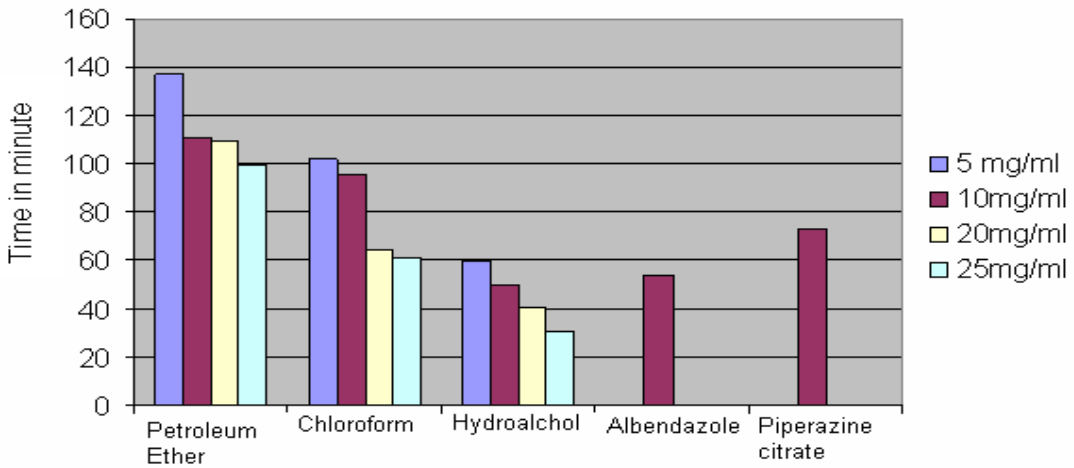

Fig 2: Time taken to death by bark extracts of *A. suma* at different concentrations and reference samples.

Source of support: Nil, Conflict of interest: None Declared