Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Archives of Applied Science Research, 2012, 4 (3):1240-1243
(http://scholarsresearchlibrary.com/archive.html)

ISSN 0975-508X
CODEN (USA) AASRC9

Investigating the molluscicidal potential of some members of Nigeria sapindaceae family

***[1] Agboola Olubumi Isaiah, [2] Ajayi Glory Oluremilekun, [2]Adesegun Sunday and [3]Adesanya Saburi Adejimi**

[1]Department of Pharmacognosy and Herbal Medicine, Faculty of Pharmacy Niger Delta University Wilberforce Island Bayelsa State
[2] Department of Pharmacognosy, Faculty of Pharmacy University of Lagos
[3]Department of Pharmacognosy Faculty of Pharmacy Obafemi Awolowo University Ile-Ife Nigeria

---

ABSTRACT

Nigeria is one of the countries with the highest number of people infected with Schistosomiasis and for the control and or eradication of this disease, an integrated approach involving chemotherapy, vector control and health education is imperative. In case of vector control, the use of plants available locally in the endemic areas is recommended. The family Sapindaceae consists of about 2000 species in about 150 genera. They are mostly trees and shrubs but rarely herbs and most are used in ethno-medicine as fish poison. A total of 11 extracts from 8 plants in the family Sapindaceae were screened for mollusccidal activity against Biomphalaria glabrata snail, one of the vector of schisosomiasis, The results showed that only the stem bark of Zanha goluogensis gives 100% mortality at 150ppm with LC_{50} 60ppm of which is above the level recommended by the World Health Organization

---

INTRODUCTION

The family Sapindaceae consists of more than 2000 species from about 150 genera. They are mostly trees and shrubs but are rarely herbs and are widely distributed throughout warm sub-tropical and tropical regions.

Majority of the species are native to Asia, Africa and Australia. The traditional uses of members of the family varied and include the following as shown in the table 1.

Saponins are present in the fruits, seed and leaves of several species which are ingredients used in detergents and many saponins containing plants have proven very toxic to snails that transmit *schistosomiasis* to humans. [1]

Saponins are a vast group of glycosides widely distributed in higher plants. They are highly toxic to mollusks and have been investigated as molluscicides in the control of schistosomiasis [2]

Schistosomiasis is an endemic parasitic disease, affecting the tropical and subtropical regions of the world. It is caused by the presence of the worm *Schistosoma mansonii* in the liver of the affected person [3] Other types of *Schistosoma* that infect humans are S. *mansoni*, and *S. intercalatum* which causes intestinal schistosomiasis, while *S.*

hermatobium causes urinary S*chistosomiasis* while *S japonicum* and *S. mekongi* cause Asian intestinal schistosomiasis

Table 1

Name of Plants	Ethnobotancal Uses	Plant Parts Used	Place of collection	Voucher Number
Allophylus africanus P. Beauv	To relieve headache, diarrheoa, vermifuge	Leaves	Eruwa road	LUHN3316
Blighia sapida K.D.Koenig	Migraine, yaws ulcer and fever	Leaves	FRIN	LUHN3318
Cardiospermum halicacabum L	Used as vegetable, amenorrheoa, rheumatism, pulmonary complaints	Whole plant	Eruwa road	LUHN3315
Chytranthus setousus Radllk	Condiments and flavoring	leaves	Olokemeji Forest Reserve	LUHN3444
Deinbolia pinnata Sch. et Thon	Febriduge, analgesic, bronchiasis intercostals and intestinal pain	Leaves and seed	Eruwa road	LUHN3314
Lecaniodiscus cupanioides Planch.	Toothache,	Leaves and seed	Eruwa road	LUHN3313
Paulina pinnata L	Colic, diarrheoa, dysentery	Whole plant	FRIN	LUHN3319
Zanha golugensis Hiern	Malaria, analgesic for headache	Stem bark and leaves	FRIN	LUHN333317

It is second only to malaria in terms of prevalence, public health and socio-economic importance [4]

The common treatment for *schistosomiasis* is the use of Praziquantel but the problem with this approach alone is the rapid rate of re-infection after exposure to the drug [5],]hence a multifaceted approaches are desirable and one way to tackle the problem of *schistosomiasis* is to delink the life cycle of *schistosomes* by killing the intermediate host [6] Mollusciciding with synthetic agents such as Copper Sulphate, Niclosamde, etc have the problem of cost, biodegradability and general effect on the environment as well as probable in-correct application by the local people living in endemic areas hence the need for an agent that is locally available readily degradable and with little or no cost to the local people

This make the search for effective molluscicides of plant origin a continuous process as the use of plants with molluscicidal properties is a simple ineffective and appropriate technology for the focal control of snail vector [7] In recent times the use of plants products has gained unprecedented impetus all over the world [8] The interest in studying plant material containing molluscicidal compounds is based on the idea of local supply of molluscicides which can be provided at low costs by simple technologies [9]and several countries have promoted the use of plant products due to a wide range of ideal properties such as high target toxicity, low mammalian toxicity low costs solubility in water, easy biodegradability and abundant growth in endemic areas and operator safety [8]

MATERIALS AND METHODS

Plant Collection The plants were collected in March 2010 in various places as shown in Table 1 with the assistance of Mr. Benjamin Daramola and Mr. Odewo both members of staff of Herbarium Department of University of Lagos in the places so indicated and voucher specimen were so deposited in the Herbarium.

Extract Preparation The plants were dried at room temperature and ground to powder. 50g each of the various plants parts were weighed and macerated with 50% Ethanol for 24 hours, filtered and the filtrate concentrated to dryness using a rotary evaporator under vacuum. The extraction for each plant was carried out thrice and the three extract pooled together and kept in the desiccators until needed.

Molluscicidal Screenings The molluscicidal screening was divided into 2 stages

(i) Rapid Screening and Final Screening.
For the rapid screening the methods of Bilia *et al*., 2000 [10] was used with slight modification and the modification was to use two concentrations instead of one i.e. (1000 and 500ppm) Extracts with 100 % mortality at 500ppm were then subjected to the final screening using the method of Truiti *et al* 2005 [11]

The snails used were of the genus *Biomphalaria glabrata* and were collected from water sources that had not been treated with molluscicides. The snails were left to acclimatize to laboratory conditions for 10 days as described by Al-Zanbagi *et al*., 2000 before use. [12]

The experiments were conducted in the dark and at room temperature; the snails were not fed or disturbed during the exposure and recovery period

For positive control, Copper Sulphate at a concentration of 1ppm was used and for negative control De-chlorinated water was used.

The LC_{50} was calculated with the aid of Probit analysis table plotted on a graph paper.

RESULTS

Table 2; Results of Rapid Screening

Plants Names	Concentrations ppm	
	1000	500
Allophylus African	-ve	-ve
Blighia sapida	-ve	-ve
***Cardiospermum halicarcabum* whole**	-ve	-ve
***Chrysanthus setouses* leaves**	-ve	-ve
***Deinbollia pinnata* leaves**	-ve	-ve
***Deinbollia pinnata* seeds**	+ve	-ve
Lecanodiscus copanoioidis	+ve	-ve
***Lecanodiscus copanoioidis* seeds**	- ve	-ve
Paulina pinnata	+ve	-ve
***Zanha golungesis* leaves**	+ve	-ve
***Zanha golungensis* stem bark**	+ve	+ve

Activity were recorded after 24 hours of test followed by another 24 hours of recovery in a fresh de-chlorinated water
-ve means no death at the test concentration
+ve means100% mortality at the test concentration

Table 3 Results of Molluscicidal Screening of *Zanha golungensis* stem bark

Concentrations (ppm)	500	400	300	200	150	140	130	120	110	100
% Mortality	100	100	100	100	100	60	10	0	0	0
LC_{50}	60ppm									

DISCUSSION

The results of the rapid screening as well as that of the final molluscicidal screening were summarized in table 2 and 3 above.

For plant to be considered as having molluscicidal potential according to the World Health Organisation guidelines, a methanolic or lipophilic extract should be active at equal to or less that 20ug/l to kill 90% of snails exposed for 24 hours..[13] The best result obtained in this study was 60 ug/l for the stem bark of *Zanha goluogensis* and the morphological used was the stem bark which is not considered an ideal source of molluscicdes since continous exploitation of the barks will result in the death of the plant.

The molluscicidal activity of saponns are generally considered to be due to thier heamolysis ability but it must also be noted that not all saponins have the ability to cause heamolysis as this propetty is not common to all saponins [2] hence the absence of activity or low activity may be due either this or because the concentration at which each of the plants will exhibit its action is more than the concemtrations used in this study.

It is also important to note that triterpenoids saponins are the most efeective plant saponis mollucicides and it is posible that the plants even though may contain saponins and may have the ability to cuse heamolysis but the saponins present may not be triterpenoids.

REFERENCES

[1] HM Burkill. (**2000**) The Useful Plants of West Tropical Africa 2nd Edition Royal Botanical Garden, Kew2000
[2] SG Sparg, ME Ligbt,, J van Staden . (**2004**) *Journal of Ethnopharmacology* 94, 219-243
[3] AF dos Santos, AEG. Sant`Ana (**2001**). *Phytomedicin*e 8(2)115-120
[4] AA Adedotun, AB Odaibo. (**2008**) *Travel Med Infec Dis*.6,219-27
[5] PJ. Whitfield (**1996**) *Transaction of The Royal Society of Tropical Medicine and Hygiene 90*; 596-600
[6] Chen Sheng-Xia, Wu Ling, Yang Xiao-Ming, Jang Xu-Gan. (**2007**). *Biochemistry and Physiology* 89; 237-241
[7] K Hostetmann (**1989**) *Economic and Medicinal Plants Research*. 3; 72-103
[8] SK Singh, PY Ram, A Singh (**2010**). *Journal of Applied Toxicology* 30, 1-7
[9] E Lemmick,, C, Cornett, P,Furu, CL Jorstan , AN Knudsen, CA Olsen, A Sakih ST Thikborg .(**1995**) *Phytochemistry* 1, 63-68.
[10] RA Bilia, A Braca, J Mendez, I Morreli. (**2000**) *Pharmacology Letters* 16; 53-59
[11] MCT Truiti, CP Ferreira, MLM,,, Zamunner, CV Nakamura, MH, Sarragoitto, MC Souza (**2005**). *Brazilian Journal of Medical and Biological Research* 38; 1873-187
[12] AN Al-Zanbagi, BA Abdul-Ellah, J Barret. (**2000**) *Journal* of *Ethnopharmaco;ogy* 70; 119-125
[13] Nick Andre, Rali Tapul and Sticher Otto. (**1995**). *Journal of Ethno- - pharmacology*. 49, 147-156