Indexed, Abstracted and Cited: Index Copernicus International (Poland), ISRA Journal Impact Factor, International Impact Factor Services (IIFS), Directory of Research Journals Indexing (DRJI), International Institute of Organized Research and Scientific Indexing Services, Cosmos Science Foundation (South-East Asia), International Innovative Journal Impact Factor, Einstein Institute for Scientific Information {EISI}, Directory of Open Access Scholarly Resources, Science Indexing Library (UAE), Swedish Scientific Publication (Sweden), citefactor.org journals indexing, Directory Indexing of International

World Journal of Biology and Medical Sciences

Published by Society for Advancement of Science®

ISSN 2349-0063 (Online/Electronic)

Volume 5, Issue-4, 69-74, October - December, 2018

Journal Impact Factor: 4.197

WJBMS 05/04/090/2018

A Double Blind Peer Reviewed Journal / Refereed Journal

www.sasjournals.com

wjbmedsc@gmail.com/wjbms.lko@gmail.com

REVIEW ARTICLE

Received: 15/09/2018 Revised: 18/09/2018 Accepted: 19/09/2018

Study of Molluscicidel Activity of *Balanitesa egyptiaca* on freshwater snails in, Khartoum Sudan

Mohammed Alfatih Abd Alla, Ali Ibrahim Essa, *Awad Eljeed Abugooda Alobaid and **Mohammed Almosfa Kamal

Department of Parasitology and Medical Entomology, Faculty of Medical Laboratory Sciences, AL-Yarmouk College, Khartoum, Sudan

***Department of Histopathology and Cytopathology, Faculty of Medical Laboratory Sciences, AL-Yarmouk College, Khartoum, Sudan**

****Department of Histopathology and Cytology, Faculty of Medical Laboratory Sciences, University of Khartoum-Sudan**

ABSTRACT

The treatment of freshwatersnails with lethal concentration of herbal molluscicides was effective in altering the amino acid profile of this snail species which contributed to the impairment of snail's laying capacity. The herbal molluscicides were reported to contain diverse chemical profile; steroidsthe botanical molluscicides are of economic importance, especially in developing countries. Also, there is a continuous need to search for new plant species with ideal molluscicidal properties. Different plants (e.g. Balanitesa egyptiaca) have been reported as molluscicides. Aimed this study to test the Molluscicidal Activity of Aqueous and ethanolic Extracts of Balanites aegyptiaca against freshwater snails.

This wasan experimental study design. It was conducted in Al-keriab area in East Nile locality. In this study 140 snail samples were randomly obtained from the canalfrom the main water canals supplying the irrigated schemes of the study area.

The study found that, the aqueous and ethanolic extracts of B. aegyptiaca bark and fruits possess a strong (100%) molluscicidal property. This study concludes that aqueous and ethanolic extracts of B. aegyptiaca bark and fruits possess a strong molluscicidal property.
Keywords: Molluscicidel Activity, Balanitesaegyptiaca, Schistosome, Snails and Alkeriab.

INTRODUCTION

Currently, there is an increased attention for the use of new molluscicides which are highly effective, rapidly biodegradable, less expensive, readily available and probably easily applicable with simple techniques than synthetic molluscicides. One of the new trends in the biological control of vectors of diseases is testing the toxicity of plant extracts, as alternatives to chemical molluscicides, which proved to be environmentally safe and have less residual activity (Appleton, 1975). There are many restrictions of using molluscicides with fresh water. Therefore, the safety of plant extracts to human being is an advantage for studying their effect against the snail vectors of schistosomiasis (Christie and Upatham, 1977). The treatment ofsnails with sub lethal concentration of herbal molluscicides was effective in altering the amino acid profile of this snail species which could be contributed to the impairment of snail's egg laying capacity, snail-schistosome miracidiae finding mechanisms and immune response of the molluscan hosts but has no effect on the mammalian skin penetration rate by schistosome cercariae.The herbal molluscicides of *Balanitesa egyptiaca* was reported to contain diverse chemical profile; steroids and triterpenes, flavonoids, tannins and phenolic compounds, tetradecahydro xanthenediones, in addition to the essential oils. The diversity of chemical constitution of different Callistemon species reflects diversity in its biological activities; antibacterial and antifungal activities, molluscicidal activity (Pimentel-Souza et al., 1990). Reviewing the current literatures *Balanites aegyptiaca*were not intensively investigated for mulloscicidal activity. So, the aim of the present study is to evaluate the efficacy of the aqueous and ethanolic extracts of *Balanites aegyptiaca*as molluscicides against freshwater snails (Hilali, 1985). The Schistosome Intermediate Snail hosts: the intermediate host is an essential link in the schistosome life cycle.Knowledge of its ecology, bionomics and population dynamics are required for a proper understanding of the disease transmission, or as a basis for planning and evaluation of measures directed against snails in the control of the disease (WHO 1993). Despite the ability of schistosome species to develop in a variety of definitive mammalian hosts, the range of snail that serves as intermediate hosts is limited. Pulmonate snails of the family Planorbidae are the intermediate snail hosts for human schistosomes in Africa, the Middle East, the Caribbean islands and South America. The average longevity of the snail varies among the species and with the local environmental conditions (Odei, 1992).The medicinal plants: *Balanites aegyptiaca*: is a multibranched, spiny up to l0 m high. Crown rounded, dense with long stout branchlets. (Hall and Walker, 1991). Trunk and bark grey deeply fissured longitudinally. Leaves compound and spirally arranged on the shoots, dark green with 2 firm coriaceous leaflets; dimensions and shapes varying widely (Hyde, 2008). Most accounts indicate a maximum length of 8 mm for individual flowers. Rarely reaching 10 mm in length, although 15 mm is reported. The fruit is ellipsoid, up to 4 cm long, green. Ripe fruit brown or pale brown with a brittle coat enclosing a brown or brown-green sticky pulp and a hard stone seed. The name Balanites (from the Greek for acorn, referring to the fruit) was given in 1813 by AlireDelile and replaced Agialid (derived from the Arabic name for the tree, 'heglig'). (Noad, 1989). *B.aegyptiaca* has a wide ecological distribution. However, it reaches its maximum development as an individual tree on low-lying, level

alluvial sites with deep sandy loam and uninterrupted access to water such as valley floors, riverbanks or the foot of rocky slopes. It is intolerant to shade after the seedling stage and therefore prefers open woodland or savannah for natural regeneration. Its Geographic distribution includes Sudan, Angola, Benin, Burkina Faso, Burundi, Cameroon, Chad, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, (Storrs, 1995).

Medical uses: decoction of root is used to treat malaria. Roots boiled in soup are used against edema and stomach pains. Roots are used as an emetic; bark infusion is used to treat heartburn. Wood gum mixed with maize meal porage is used to treat chest pains. The bark is used to deworm cattle in Rajasthan (Mbuya*, et al*., 1994).

MATERIALS AND METHODS

This is an experimental study designed to test the Molluscicidal Activity of Aqueous and ethanolic extracts of *Balanites aegyptiaca* against freshwater snails. Carried out in Al-keriab area in East Nile locality. A total of 190 snails samples were collected from the main water canals supplying the irrigated schemes of the study area conducted throughout the period from December 2016 to April 2017.

Snail Sampling: A survey was made for the water contact site in the study area. Sampling of snails was carried out using a deep scoop described by (Amin 1982) and used by other researchers (Hilali, 1992) was used. The deep scoop was made of metal square frame 30 cm x 30 cm on which steel gauze was soldered and covered on one side by a lighter gauze of one millimeter mesh. The frame was soldered to a long metal bar to act as a handle. Hand picking of snails attached to aquatic plants, bed-rocks and other objects was also done. Hand gloves were worn as precautions against infection during each snail search (Ahmed, 1998).

Experimental Design: the evaluation of the efficiency of the extracts for killing freshwater snails was based on the "controlled test designed" (Modified from Moskey and Harwood, 1941) briefly: In the present study, adult snails were maintained under the same conditions and used as an animal model for testing the Mullocidal activity of crude extracts as follows.

Preparation of Plant Extract: One kilogram (1kg) of powdered air-dried *Balanites aegyptiaca* were macerated for 24 hours in 2.5 liters of ethanol. This was concentrated in-vacuum to dryness using water bath to obtain the ethanolic extract. The same quantity of *Balanites aegyptiaca* powders were macerated with distilled water at room temperature for 24 hours. The resultant mixture was then filtered using Whatman's filter paper and the filtratingmaterial was concentrated to dryness using water bath to obtain aqueous extract of the plant. This was scrapped and stored at -4C. For the molluscicidal activity testing, aqueous and ethanolic extracts were first homogeneously suspended in canal water with serial dilutions (1g/l, 0.5g/l, and 0.25g/l). Thereafter, they were tested for the molluscicidal activity.

Test Snails: adult snail samples were obtained from the Irrigation canal in Al-keriab area, East Nile locality. Snails were grouped to 12groups 10 snails each, every snail group were maintained in a plastic container containing 100ml of canal water.

Molluscicidal Activity Tests: Serial concentrations in gram per liter were freshly prepared with distilled water from the ethanol and aqueous dry extracts of *Balanites aegyptiaca*. Different concentration solutions 1 g/L, 0.5 g/L, 0.25 g/L were prepared. Molluscicidal evaluation of the ethanolic and aqueous extracts of the plants was performed according to WHOguidelines. The test snails (10 each) were challenged with various concentrations of both the ethanolic and aqueous extracts of the plant. After 24 hours of exposure to the

ethanol and aqueous extracts of *Balanites aegyptiaca*, the snails were transferred to fresh DE chlorinated water and maintained for another 24 hours.

Death of snails was confirmed by the absence or no reaction to irritation of the foot with a needle to withdrawal movement.

DE chlorinated water (negative control) and niclosamide (Yomesan®) (positive control), were used to monitor the susceptibility of snails and toCompare its potency with the ethanolic and aqueous extracts. Lethal concentrations were determined.

RESULTS

The Molluscicidal Activity of ethanolic and Aqueous Extracts of *B. aegyptiaca:* the effect on freshwater Snails at laboratory conditions is presented in Table (1). Application of dosages of Aqueous&ethanolic Extract of *B. aegyptiaca*(1 g/L, 0.5 g/L, 0.25 g/L) was resulted to significantly different mean mortality rates.

Table 1. The Molluscicidal Activity of Aqueous and ethanolic Extracts of *B. aegyptiaca* bark.

Aqueous and ethanolic Extract	Status	1g/l		0.5g/l		0.25g/l	
		Frequency	%	Frequency	%	Frequency	%
B.aegyptiaca	Death	10	100%	10	100%	10	100%

The Molluscicidal Activity of ethanolic and aqueous extraction of *B.aegyptiaca* fruit shell the molluscicidal effect of crude ethanolic and aqueous Extracts of*B.aegyptiaca* fruit shell were presented in Table (2). Application of dosages of ethanolic Extract of *B. aegyptiaca fruit shell* (1 g/L, 0.5 g/L, 0.25 g/L) was resulted in significantly different mean mortality rates. The most active concentration was 1g/l killed 100 % of the snails. While Application of dosages of aqueous Extract of *B. aegyptiaca* fruit shell showed that the most active concentration was 1g/l killed 100% of the snails.

Table 2. The Molluscicidal Activity of ethanolic and aqueous extraction of *B.aegyptiaca* fruit shell.

B.aegyptiaca Fruit shell Extract	Status	1g/l		0.5g/l		0.25g/l	
		Frequency	%	Frequency	%	Frequency	%
Ethanolic	Death	10	100%	10	100%	8	80%
Aqueous	Death	10	100%	10	100%	10	100%

DISCUSSION

The present study showed that aqueous and ethanolic extracts of *B. aegyptiaca* bark possess a strong (100%) molluscicidal properties. Simillarly, AbdElaziz , *et al*., (2012) reported that the bioassay of *B. aegyptiaca* against the snails gave 73.3% mortality for concentrations 10g/L in agreement, Sayed-Ahmed, (2010) reported that ethanolic extracts of *B.aegyptiaca*bark exhibits the highest molluscicidal activity as it caused 50% or more mortality. TheF. Anto, *et al*.,(2013), reported that the molluscicidal activities of aqueous preparations of the powdered, dried park of *Balanites aegyptiaca* was investigated under laboratory conditions. The concentration killing 95 % of the snails after an exposure for 24 h.

Our study showed that aqueous and ethanolic extracts of *B.aegyptiaca* fruit shell possess strong (100%) molluscicidal properties. It is in agreement with the findings of Dawidar, *et al*., (2012), who found that the bioassay of *B.aegyptiaca* fruits shell indicated the activity. The most problem in this study is the limitation of literature rive.

CONCLUSION

This study concludes that aqueous and ethanolic extracts of *B. aegyptiaca* bark and fruits shill possess a strong molluscicidal property the study needs further investigation to determine specific active compound components of the extracts, to further refine lethal dose/concentration, and rate of application under field conditions we recommended to use extracts of *B.aegyptiaca* bark and Applying in the field as well as to determine the method of application.

REFERENCES

Abdel Aziz, M.T., El-Asmar, M.F., El Nadi, E.G., Wassef, M.A., Ahmed, H.H., Rashed, L.A., Obaia, E.M., Sabry, D., Hassouna, A.A. and Abdel Aziz, A.T. (2012). The Effect of Curcumin on Insulin Release in Rat- Isolated Pancreatic Islets. Angiology. 61 (Suppl 6): 557-566.

Amin, M. A., Fenwick, A., Teesdale, C. H., Mclaren, M., Marshall, T. F. dec. and Vaughan, J. P. (1982). The assessment of a large snail control programme over aThree -year period in the Gezira irrigated area of the Sudan. *Annals of Tropical Medicine and Parasitology*, 76, 415-424.

Anto, F., Bosompem, K., Kpikpi, J., Adjuik, M. and Edoh, D. (2013). Experimental control of Biomphalariapfeifferi, the intermediate host of Schistosomamansoni, by the ampullariid snail Lanistesvaricus. *Ann Trop Med Parasitol,* 99: 203-209.

Appleton, C. C. (1975). The influence of stream ecology on the distribution of the bilharzias host snails, *Biomphalariapfeifferi* and *Bulinus* (*Physopsis*) species. *Annual of Tropical Medicine and Parasitology*, 69, 241-255.

Christie, J. D. and Upatham, E. S. (1977). Control of Schistosoma mansoni transmission by chemotherapy in St. Lucia. II. Biological results. *Am J Trop Med Hyg,* 26**,** 894-8.

Pimentel-Souza, F., Barbosa, N. D. And Resende, D. F. (1990). Effect of temperature on the reproduction of the snail Biomphalaria glabrata. *Braz J Med Biol Res,* 23**,** 441-9.

Dawidar *et al*. (2012). Molluscicidal Activity of Balanites Aegyptiaca against Monacha Cartusiana Pharm Biol 50 (10), 1326-1329. Aug 14.

Hilali, A. M. H., Desougi, L. A., Wasilla, M, Daffalla, A. A. and Fenwick, A. (1985). Snails and aquatic vegetation in Gezira irrigation canals. *Journal of Tropical Midicine and Hygiene*, 88, 75-81.

Hall, J.B. and Walker, H.D. (1991). Balanites aegyptiaca: a monograph. School of Agriculture and Forest Sciences Publication Number: 3. University of Wales, Bangor.

Hyde, M.A. and Wursten, B. (2008). Flora of Zimbabwe: Species information: Balanitesagyptiaca.http://www.zimbabweflora.co.zw/speciesdata/species. species_id=132960, retrieved 24 March 2008.

Mbuya, L.P. (1994). Useful trees and shrubs for Tanzania: Identification, Propagation and Management for Agricultural and Pastoral Communities. Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA).

Muyba, L.P. (1994). Useful trees and shrubs for Tanzania: Identification, Propagation and Management for Agricultural and Pastoral Communities. Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA).

Moskey, H.F. and Harwood (1941). Methods of evaluating the efficacy of anthelmintics. Amer. J. Vet. Res. 2:55-59.

Noad, T. and Birnie, A. (1989). Trees of Kenya. General Printers, Nairobi. Sahni KC. 1968. Important trees of the northern Sudan. United Nations and FAO.

Odei, M. A. (1972). Some preliminary observations on the distribution of bliharziasis host snails in the Volta Lake. *Bn de I, InstitutFrancais de Afrique Noire*, 34, 534-543.

Storrs AEG (1995). Know your trees: some common trees found in Zambia. Regional Soil Conservation Unit (RSCU).

WHO, (1993). The control of Schistosomiasis. *Report of World Health Organization Expert Committee. WHO Technical Report Series.*

Corresponded author: Awad Eljeed Abugooda Alobaid, Department of Histopathology and Cytopathology, Faculty of Medical Laboratory Sciences, AL-Yarmouk College, Khartoum, Sudan.

Email: awado1112@gmail.com