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Molluscicidal Activity of Some Selected Plants on Freshwater Snail *Lanistes Ovum*

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Abstract

Schistosomiasis is considered as one of the most important trematode disease of man. The most important goal of the present study is to use the natural plants as cheaper and available sources for snail control. Snails' species are associated with transmission of parasitic disease as intermediate host. This research was conducted to determine the Molluscicidal activities of some selected plants leaves extracts against freshwater snail Lanistes ovum. The plants include; Khaya senegalensis, Senna occidentalis and Vernonia amygdalina. The results of qualitative Phytochemical screening conducted on the plants revealed the presence of different phytochemical compounds which such as Tannins, Saponins, Flavonoids, Cardiac glysides, Alkaloides and Inulin. The results of toxicity studies of the plants conducted against the experimental snails indicated that, there was significant negative correlation between LC values and exposure periods. Thus with increase in exposure periods the LC_{50} values decreased from 395.58 mg/L (24 hours) to 216.48mg/L (72 hours and 96 hours was 100%) in Vernonia amaydina, Khaya senegalensis and Senna occidentalis. The LC_{90} (24 hours) doses of these plants against snails exhibited no mortality in non-target organism, Tilapia fish (Tilapia zilli). The LC_{50} at exposure period of 96 hours was the most effective treatment among all other exposure periods; 24 hours, 48 hours, 72 hours and 96 hours. The toxicity was both timed as well as dose-dependent. There was significant negative correlation between LC_{50} values and exposure periods. Thus, with increase in exposure periods LC_{50} values decreased. In case of the toxicity of S. occidentalis on L. ovum, the LC_{50} values decreased from 83.67 mg/L after 24 hours, 57.63 mg/L after 48 hours to 52.71mg/L after 72 and 96 hours. In case of Khaya. senegalensis toxicity on L. ovum, the LC_{50} values decreased from 614.288 mg/L after 24 hours, 246.22 mg/L after 48 hours and 163.11mg/L after 72 hours and 96 hours was 100% against freshwater snails. However, the toxicity of V. amygdalina on exposed snails indicated that, the LC_{50} values decreased from 395.58 mg/L after 24 hours, 285.84 mg/L after 48 hours and 216.48mg/L after 72 hours and 96 hours was 100% against freshwater snails.The leaves extract of these plants were toxic against the snail and can be of great help in the management of intestinal schistosomiasis. The study provides considerable scope in exploiting local indigenous resources as snails' molluscicidal agents.

Keywords: Molluscicidal; Activity; Plants; Freshwater; Snail.

1.0 INTRODUCTION

Schistosomiasis (Bilharzia) is one of the most widespread parasitic infections to man in tropical and subtropics areas (WHO, 1993). Schistosomiasis is a parasitic disease that affects 200 million people in different countries, and is frequently considered the second most important parasitic disease after malaria among the infectious diseases of tropical and subtropical countries (Gehad *et al*., 2009), while being the third most prevalent parasitic disease in the world in terms of overall morbidity burden, socioeconomic and public health importance, and human impact (Gehad *et al*., 2009). Schistosomiasis is a devastating disease of mankind second only to malaria in it is deleterious effects. A sure way to tackle the problem of Schistosomiasis and Fascioliasis is to destroy the carrier snail and remove an essential link in it is lifecycle (Singh *et al.*, 2013). Intestinal schistosomiasis, a systematic helminthes infection, is one of the most important socio-economic and poverty-related health problems that affect human development in developing countries (Vennervald and Dunne, 2004). Though Schistosomiasis leads to death; it is generally a disease of morbidity. Its morbidity depends on the infecting *schistosoma* species, the intensity of infection, the topographic site affected by sequestered eggs and immune responsiveness of the host (Gehad *et al*., 2009). In Africa especially Nigeria; *Schistosoma mansoni*, *Schistosoma intercalatum* are the most predominant species (Agi and Okafor, 2005).

Lanistes is a genus of freshwater snails which have a gill and an operculum, aquatic gastropod mollusks in the family Ampullariidae, the apple snails. The distribution of the genus *Lanistes* includes Africa and Madagascar. *Lanistes* has a unique anatomy among the Ampullariidae: it has a "hyperstrophic" sinistral shell. This means that the body of the snail is dextral (as in all other ampullariids), but the shell appears to be sinistral. However the sinistral appearance stems from the fact that the rotation of the shell as it grows is in an upward direction rather than the usual downward direction (Jorgensen *et al*., 2009).

Lanistes ovum is a species of freshwater snail with an operculum, an African apple snail, an aquatic gastropod mollusk in the family Ampullariidae. This species of snail is widely found in Botswana, Congo, Chad, Ghana, Cameroon, Gambia, Angola, Namibia, Niger, Nigeria, Tanzania, Mozambique, Zimbabwe and South Africa (Brown, 1994).

Schistosomiasis control, usually takes place through two main means, chemotherapy and snails control (Alves *et al.*, 2000). Snails control is achieved mainly by using molluscicides. The numerous disadvantages of using synthetic molluscicidal agents stimulated endemic area to find a safe alternative mean, which is molluscicides (Wanyonji, 2003). One approach for using plant molluscicides in controlling snails intermediate host of schistosomiasis, is treating both snails and infectious larvae (cercariae and miracidia), this complementary methods is suggested by many researchers as the snails and the larvae shares the same aquatic habitat (Raunelli and Sergio, 2009). In a continuing search for new plants for the control of the vector of schistosomiasis, this work aims at evaluating some local medicinal plants for their molluscicidal properties with the hope that these plants can be practically applied in the field.

Medicinal plants regained their real position in the last two decades as a vital remedy for many diseases. This could be due to the fact that most of the synthetic drugs possess serious side effects, while using medicinal plants is safer. Therefore, most countries all over the world paid a great attention to the production, manufacturing and use of medicinal plants (Maryann, 1998).

This work is aims at evaluating some local Nigerian plants for their molluscicidal properties with the hope that these plants can be practically be applied in the field.

2.0 MATERIALS AND METHODS

2.1 Sample collection

Test Snails

The adult freshwater snails *Lanistes ovum* were collected from the freshwater bodies in Kwalkwalawa river along Usmanu Danfodiyo University road, Sokoto Nigeria. The snails were taken to the Department of Zoology, University of Ibadan, Nigeria for identification. The specie of snail was identified as *Lanistes ovum* on 16th December, 2012 and confirmed by Professor Dakul D.A. from the Deparment of Zoology, University of Jos, Nigeria on 16th March, 2015. The snails were kept in a plastic tank containing de-chlorinated tap water for 48hr for acclimitization under laboratory conditions in parasitology laboratory of Usmanu Danfodiyo University Sokoto from 11th March, 2013 to 26th August, 2013 at a temperature of 28^0C-31^0C.

Plant Materials

2.2 Preparation and Preservation of Plant Extracts

The plant species were collected by hand picking of leaves locally from their natural habitat in Wamakko Local Government Area. The plants are include; *Senna occidentalis*, *Vernonia amygdalina* and *Khaya senegalensis*. Plants were taken to Herbarium of the Department of Biological Science, Usmanu Danfodiyo University Sokoto, Nigeria for identification and authentication. All the plants were identified and authenticated with the following voucher numbers; *S. occidentalis* (UDUH/ANS/0110), *K. senegalensis* (UDUH/ANS/0107) and *V. amygdalina* (UDUH/ANS/0107). The plants were washed thoroughly in running tap water after which they were shed dried. The plant leaves were grounded using mortar and pestle. The plant leaves were homogenized to a fine powder with the aid of sieve and stored in air tight bottles for aqueous extracts and phytochemical analysis.

One kilogram (1 kg) each of the air-dried plant leaves were ground into fine particles and extracted twice with 2.5 litres each of alcohol at room temperature for 72 hr with shaking. The total extracts were filtered, and then concentrated to dryness in vacuo under reduced pressure in a rotary evaporator at 4 + 5 °C and finally yielded crude total extract of the plant leaves.The ethanol extract was prepared by soaking leaves powder overnight in cold 70% ethanol (Sofowora, 2008).

2.3 Preparation of Plants Extracts Concentrations

The different plant extracts were prepared using four solvents, namely petroleum ether, chloroform, acetone and methanol applying one after another. The extracts were collected separately. Each solvent extract was filtered, concentrated by evaporation in a rotary evaporator and the solid residues were weighed. The total yield of each extract from 1kg of leaves was: petroleum ether extract, 4.5 g, chloroform extract, 6.4 g, ethyl acetate extract, 4.00 g; and methanol extract 5.6 g. Different test dilute solutions, ranging from 10 to 1000 mg/L, (i.e, ppm) were prepared from the stock solutions, using deionized and dechlorinated water, to determine the LD50 and LD90 values.

Aqueous extracts of the plants used were prepared, the plants include; S. *occidentalis*, K. *senegalensis* and V. *amygdalina* leaves. Five milliliters (5ml) of distilled water was poured into test tubes, 15 test tubes were provided and were cupped with cotton wool and wrapped with aluminum foil. The test tubes were sterilized using autoclave. The stock solution was prepared using 10g of the solid plant extract dissolved in 100mls of normal saline making a stock of 100mg/ml. The concentration was prepared from the stock solution using dilution formula as shown below:

$$C_1V_1=C_2V_2$$

Where: C_1=present concentration V_1=volume to use C_2= Required concentration V_2= Required volume.

The test tubes were arranged serially and label as 20mg/ml, 30mg/ml, 60mg/ml and 90mg/ml accordingly. To prepare these concentrations a given amount of 0.1g, 0.2g, 0.4g, 0.6g, 1.0g of the stock solution of the plants were dissolved in three different test tubes each containing 5mls of sterilized distilled water (Sofowora, 2008).

2.4 Qualitative Phytochemical Analyses of the Plants

Previously prepared powdered of all the plants materials were used. The aqueous extracts of *Senna occidentalis, Vernonia amygdalina* and *Khaya senegalensis* were phytochemically screened for secondary metabolites such as

Tannin, Saponin, Flavonoids, Alkaloids and Cardiac glycosides (Sofowora, 2008).

Test for Alkaloids: - 2ml of each of plant was stirred with 2ml of 10% aqueous hydrochloric acid. 1ml was treated with a few drops of wagner's reagent and second 1ml portion was treated similarly with Mayers reagent. Turbidity or precipitation with either of these reagent is taken as evidence for the presence of alkaloids (Harbone, 1973).

Test for Cardiac glycoside: - To 1ml of extract 2ml of 3.5% ferric chloride solution was added and allowed to stand for 1 minute. 1ml (I of conc. H_2So_4 is carefully poured down the wall of the tube so as to form a lower layer. A reddish brown ring, the interface indicates the presence of cardiac glycoside (Killer-killiani's test).

Test for Flavonoid: - 3ml aliquot of the filtrated and 1ml of 10% NaOH sodium hydroxide, if a yellow color is developed this indicate the possible presence of flavonoid compounds (Harbone, 1973).

Test for Tannins: - Ferric chloride solution 5% ferric chloride solution was added drop by drop 2-3 ml of the extract and the colored produced is noted. Condensed tannins give blue-black color (Harbone, 1998).

Test for Saponin:- 5ml of the extract will be placed in a test tube +5ml of water was sharked strongly. The whole tube will be filled fronth that lasts for several minutes (Harbone, 1998). To 2.5ml of the extract was added 2.5ml of fehing's solution A and B a blue-green precipitate showed the presence of saponin (El-Olemy *et al*., 1994).

Test for Inulin:- One miligram of the extract was added in 2 ml of water and 1 ml of Fehing's reagent which contained a mixture of Fehing's solution I and II added the mixture were heated. A brick red precipitate denoted the presence of inulin (El-Olemy *et al*., 1994).

2.5 Molluscicidal Activity Test

Molluscicidal evaluation of plant was carried out according to the standard procedures described by (WHO, 2012). A group of 10 untreated snails were placed in an aquarium (container) with some sand, snail food, and 1000 mL of deionized and dechlorinated pond or tap water bubbled with atmospheric air. Tests were carried out at room temperature (°C). In each setup, the snails were prevented from crawling out of the glass container by means of a fine stainless steel mesh placed above the water surface and 3 litres of tap water bubbled with atmospheric air. Experiments were carried out at 25^0C-28^0C. In each setup, the snails were prevented from crawling out of the container by means of a fine stainless steel mesh placed above the water surface. The test snails were challenged with various concentration of plant extract ranging from 20 to 90mg/L. After 96 hours of exposure to plant extract, the death of snails was recorded and confirmed by the absence of heartbeat and lack of reaction to irritation of the foot with a blunt wooden probe to elicit typical withdrawal movement. Control solutions were also made with deionized and dechlorinated tap water. Molluscicidal test with each plant extract dose was separately repeated three times. The snails were neither fed nor disturbed during the exposure and recovery periods.

2.6 Toxicity Studies

Snails were exposed for 24 hours, 48 hours, 72 hours and 96 hours at different concentrations of single or mixture of *Senna occidentalis*, *Vernonia amygdalina* and *Khaya senegalensis* extracts. The control groups of snail were kept in similar condition without any treatment. Each set of experiments, were replicated six times. The snails were neither fed nor disturbed during the exposure and recovering period. Each dose was represented by six aquaria. Snails were daily observed and dead snails were removed immediately. The mortality was recorded after every 24 hours during the observation period of 96 hours. Contraction of the snail body within the shell and no response to a needle probe were taken as evidence of death of snails. Death snails were removed to prevent the decomposition of body in experimental aquarium. Toxicity test was performed by the method of (Rawi, 2011). Ten snails were kept in aquaria containing 3 Litres of de-chlorinated tap water. Snails were exposed for 24 hours, 48 hours, 72 hours and 96 hours at four different concentrations of tertiary treatment. Each set of experiments, was replicated six times. Mortality was recorded after every 24hrs period of exposure. When a mechanical stimulus was applied to the foot sole, the snails was observed immediately retracted in to its shell. There will be visible swelling of the cephalopodal mass.

Development of hemorrhagic "blister" over the ventral surface of the foot-sole was also observed. The active dose of plant property will caused the cephalopodal mass of each snail to become severely swollen, turgid and failing to respond to mechanical stimulation with a blunt needle. Dead snails were removed to prevent the decomposition of the body in experiment. Mucous secretion was observed over most the foot The snails were dissected and hermaprodite glands were removed and fixed for histological examination (Gehad *et al.,* 2009).

2.7 Histological examinations

For histological examinations, hermaphrodite gland of *Lanistes ovum* were removed, fixed in 10% neutral buffered formalin, embedded in paraffin and sectioned. The sections were stained with haematoxyline and eosin (Rawi *et al*., 2011).

3.0 RESULTS

From the results obtained, plates 1, 2 and 3 indicated the pictures of the plants used for the investigation**.**

The results of qualitative Phytochemical screening conducted on the plants revealed the presence of different phytochemical compounds which include; Tannins, Saponins, Flavonoids, Cardiac glysides, Alkaloides and Inulin.

The toxicity study of the three plant extracts were found effective on freshwater snail in (Tables 2- 4). The LC_{50} at exposure period of 96 hours was the most effective treatment amongst all other exposure period i.e. 24 hours, 48 hours, 72 hours and 96 hours. The toxicity was both time as well as dose-dependent. There was significant negative correlation between LC_{50} values and exposure periods. Thus, with increase in exposure periods and LC_{50} values decreased.

Table 2 indicated the toxicity of *S. occidentalis* on *L. ovum*. The LC_{50} values decreased from 83.67 mg/L after 24 hours, 57.63 mg/L after 48 hours to 52.71mg/L after 72 and 96 hours.

In case of *K. senegalensis* toxicity on *L. ovum*, the LC_{50} values decreased from 614.288 mg/L after 24 hours, 246.22 mg/L after 48 hours and 163.11mg/L after 72 hours and 96 hours was 100% against freshwater snails in (Table 3). However, Table 4 indicated the toxicity of *V. amygdalina* on exposed snails, the LC_{50} values decreased from 395.58 mg/L after 24 hours, 285.84 mg/L after 48 hours and 216.48mg/L after 72 hours and 96 hours was 100% against freshwater snails.

The toxicity of tertiary combination of *S. occidentalis, K. senegalensis* and *V. amygdalina,* plant against exposed snails, the LC_{50} values decreased from 116.11 mg/L after 24 hours > 77.10 mg/L after 48 hours > 42.48 mg/L after 72 hours and 28.51 mg/L after 96 hours against freshwater snail in (Table 5).

Plate 4 indicated the Photomicrograph of the hermaprordite gland of normal *L.ovum* snail showing fluid filled containing cavity suggestive of intact normal tissue. Plate 5 showed the Photomicrograph of the hermaprordite gland of *Lanistes ovum* after 96 hours exposure for the combination of *S. occidentalis*, *V. amygdalina* and *K. senegalensi* (20 mg/L) showing severe diffuse vacualation and degeneration of the gland and interstitium.



Plate 1: Pictorial section of *Senna occidentalis.*



Plate 2: Pictorial section of *Khaya senegalensis.*



Plate 3: Pictorial *Verninia amygdalina.*

Table: 1: Qualitative Phytochemical Analyses of *Senna occidentalis*, *Khaya senegalensis* and *Vernonia amygdalina* .

Test	*Senna occidentalis*	*Khaya senegalensis*	*Vernonia amygdalina*
Tannins	+	+	+
Saponins	-	+	+
Flavonoids	+	+	+
Cardiac glysides	+	+	+
Alkaloids	+	+	+
Inulin	+	+	+

(+) Positive: Presence of given compound,(-)Negative: Absence of given compound

Table 2: Results of Molluscicidal Activity of *Senna occidentalis* on Freshwater snails Exposed to Different Lethal Concentrations.

Exposure periods (Hours)	Effective dose(mg/L) LC_{50}	Limits (mg/L) LCL	UCL	Slope value	't' ratio	'g' value	Heterogenity Factor
24h	83.67	73.21	93.55	3.13±0.41	7.52	0.06	0.37
48h	57.63	44.74	68.25	3.03±0.44	6.80	0.08	0.40
72h	52.71	39.43	63.40	2.96±0.45	6.51	0.09	0.32
96h	100% mortality	_	_	_	_	_	_

Key:- UCL = Upper Confidence Limit
LCL = Lower Confidence Limit
"t" value = Regression Test
"g"value = Potency estimation Test

Table 3: Results of Molluscicidal Activity of *Khaya senegalensis* on Freshwater snails Exposed to Different Lethal Concentrations.

Exposure periods (Hours)	Effective dose(mg/L) LC_{50}	Limits (mg/L) LCL	UCL	Slope value	't' ratio	'g' value	Heterogenity Factor
24h	614.288	746.43	1317.78	2.14±0.60	3.53	0.30	0.24
48h	246.22	131.04	307.99	1.68±0.55	3.030	0.41	0.22
72h	163.11	96.72	204.64	2.88±0.64	4.45	0.19	0.48
96h	100% mortality	_	_	_	_	_	_

Key:- UCL = Upper Confidence Limit
LCL = Lower Confidence Limit
"t" value = Regression Test
"g"value = Potency estimation Test

Table 4: Results of Molluscicidal Activity of *Varnonia amygdalina* on Freshwater snails Exposed to Different Lethal Concentrations.

Exposure periods (Hours)	Effective dose(mg/L) LC_{50}	Limits (mg/L) LCL	UCL	Slope value	't' ratio	g value	Heterogenity Factor
24h	395.58	341.94	586.11	3.79±0.99	3.80	0.26	0.31
48h	285.84	258.98	323.19	3.91±0.90	4.030	0.20	0.21
72h	216.48	178.97	239.31	4.26± 0.93	4.57	0.18	0.37
96h	100% Mortality	–	–	–	–	–	–

Key:- UCL = Upper Confidence Limit
LCL = Lower Confidence Limit
"t"value = Regression Test
"g"value = Potency estimation Test

Table: 5: Results of Molluscicidal Activity of *Senna occidentalis, Khaya senegalensis and Varnonia amygdalina* on Freshwater snails Exposed to Different Lethal Concentrations.

Exposure periods (Hours)	Effective dose(mg/L) LC_{50}	Limits (mg/L) LCL	UCL	Slope value	't' ratio	g value	Heterogenity Factor
24h	116.16	81.37	263.39	1.568±0.36	6.20	0.20	0.50
48h	77.10	60.05	119.88	1.72±0.34	4.95	0.15	0.12
72h	42.48	35.63	50.64	2.31±0.34	6.63	0.87	0.27
96h	28.51	23.14	33.42	2.14±0.35	6.02	0.95	0.50

Key:- UCL = Upper Confidence Limit
LCL = Lower Confidence Limit
"t"value = Regression Test
"g"value = Potency estimation Test

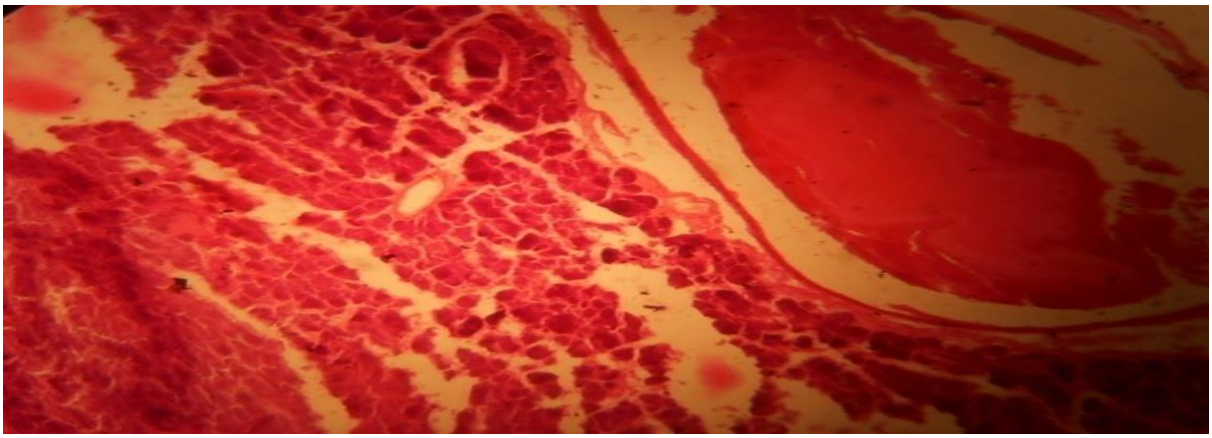


Plate 4: Photomicrograph of the hermaprordite gland of normal *L. ovum* snail showing fluid filled containing cavity suggestive of intact normal tissue. (H.E X100).

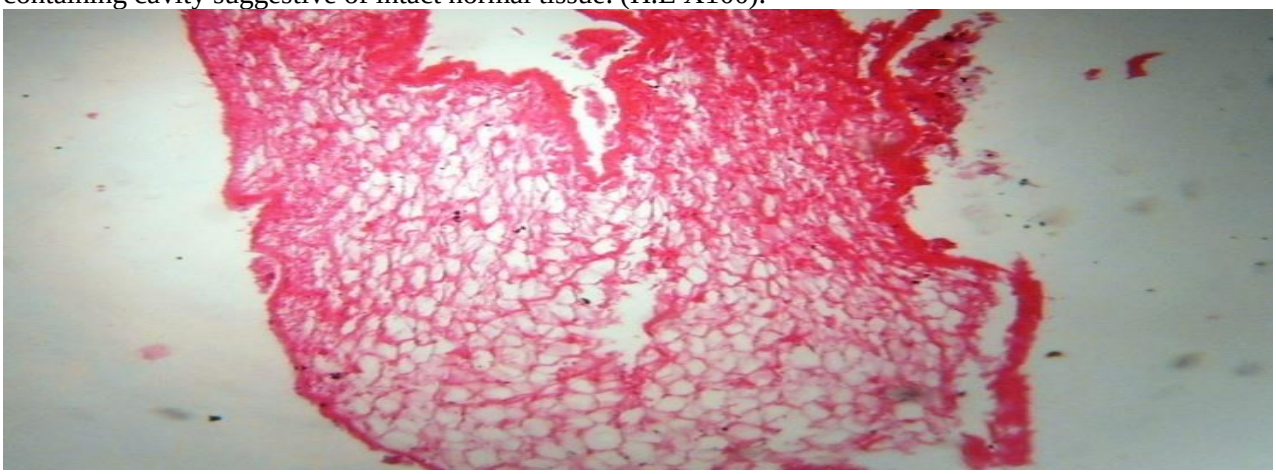


Plate 5 Photomicrograph of the hermaprordite gland of *Lanistes ovum* after 96 hours exposure for the combination S. *occidentalis*, *V. amygdalina* and *K. senegalensi* (20 mg/L) showing severe diffuse vacualation and degeneration of the gland and interstitium. (H.E X100).

4.0 DISCUSSION

The phytochemical analysis of the plants used in this study showed the presence of some phytochemical compounds such as tannins, saponin, flavonoids, cardiac glysides, alkaloids and inulin may cause high mortality among the exposed snails in all the treatments. This finding agree with the work of Singh and Singh (2013), who reported that, in many plants the activity of compound in the exposed animal was due to the presence of saponin contents, triterpenoid and alkaloid component of the plants. It is also in line with the work of Rawi *et al,* (2011) which revealed saponin as the principal components that led to the high mortality, thus, high saponin in *K. senegalensis* exhibit high molluscicidal property and more cellular damage on exposed snails (Akinpelu *et al.*, 2012).

It is evident from result section that, *Senna occidentalis*, *Khaya senegalensis* and *Vernonia amygdalina* leaves extract are toxic against freshwater snails. It is clear from the result that, *S. occidentalis* had highest toxicity against snails exposed to different concentration which may be due to the high presence of tannin in it which caused reduction in blood glucose level in the snail body leading to death of snails (Rawi *et al.*, 2011).

It is clear from the result section that, high mortality recorded with regard to *K. senegalensis* treated snails can be attributed to the presence of high quantity of alkaloids which caused inhibition in alpha-glucosidase and

reduce the glucose transport through the intestinal epithelium This report is in agreement with (Revathi *et al*., 2015).

From the result obtained in this research it was observed that the use of plant singly , especially in the case of *S. occidentalis* is more effective than combination the three plants against the test organism *L. ovum*, this could be attributed to the that certain compounds reduces the molluscicidal activities of others if combine together. This findings were contrary with the findings of Chauhan and Singh (2011), who reported that, the use of plant in combination is more effective than individual plant toward snails control, while the findings of this study were also in agreement with the work of Akinpelu *et al*, (2012), who reported that the toxicity of other compounds that are active even in small amount reduces the molluscicidal efficacy of the other compound that causes mortality in high proportion.

It is also observed that, there was a positive relationship between exposure period and mortality of snails. The increase in mortality with increase in exposure period could be due to several factors. These factors include exposure period/time and doses used may be acting separately or jointly and caused mortality in all set up. This finding were in agreement with findings of Rawi *et al*, (2011), who reported that, the uptake of plant compound used could be time dependent leading to a progressive increase in the titre of the ingredient and its effects on the snails. Thus the exposure time is another important determination of toxic effects on exposed animals.

The individual plant are more effective than combination toward snails, histopathological damage in the hermaphrodite gland of treated snails showed severe destruction by individual plant than in combination. The effect observed are not similar but depend on the compound used. The histopathological effect on snail's gonadal organ showed slight and severe disintegration of gonadal cell, diminished in size and number. The degree of damage depend on the amount of toxicant absorbed by the snails gonadal tissue, thus affect the transport system between the cells, this could be seen with *K. senegalensis* and *S. occidentalis* which caused severe damage followed by *V. amygdalina* and in tertiary combination with moderate gonadal tissue damage (Plate 5). These findings were in agreement with the work of (Rasheed, 2002) who reported that Lipophilic of botanical extract affect the lipid layers of the cell membrane which destroy specific permeability properties and this caused dehydration.

The toxicity of *(Senna occidentalis, Khaya senegalensis* and *Vernonia amygdalina)* against freshwater fihes (T. *zilli*) which shared the same habitat with the snails used, showed that; there was no mortality in all the treatment of LC_{90} 24 hours exposure period. This was as result of the doses that kills snails are not liable to kills the fishes due to their difference in body metabolites.

The steep slope values observed in all the toxicity cases demonstrated that a small increase in the concentration of molluscicide cause large mortality in the snails. A value of't' ratio greater than 1.96 indicates that regression is significant. Value of the heterogeinity factor less than 1.0 denote that in the replication test of random samples, the concentration response line would fall within 95% confidence limit and thus, the model fits the data adequately. The index of significance of potency estimation 'g' value indicates that, the values of these within the limits at all probability levels. (90, 95, 99) as it is less than 0.5.

5.0 CONCLUSION

The result obtained from this study indicated that, the use of *Senna occidentalis, Khaya senegalensis* and *Vernonia amygdalina leaves* plant extract was able to kill fresh water snail (*Lanistes ovum*) populations when used as molluscicidal property, based on the findings of this research, these plants can be use in the control of Schistosomiasis disease in the study area. Futher research on the quantitative phytochemical and structural elucidation of the plants components is encouraged.

6.0 REFERENCES

Agi, P.I., Okafor, E.J. (2005). The Epidemiology os *Schistosoma haematobium* in Odau Community in the Niger Delta Area of Nigeria. *Journal of Applied Science and*

Environmental Management, **9** (3): 37-43

Akinpelu, B.A., Dare, C.A., Adebesin, F. I., Iwalewa, E. D. and Oyedapo, O.O. (2012). Effect of stem-bark of *Erythrophleum suaveolens* saponin on fresh water snail *Lanistes lybicus* tissues. *African journal of Environmental science and Technology*. **6** (11), pp 446-451

Brown, D.S. (1994). Fresh water snails of Africa and their medical importance. CRC Press. ISBN 978-0-7484-0026-3

Chauhan, Suraj., and Singh, A. (2011). Molluscicidal potential of *Lantana indica Alstonia scholaris* plants against freshwater snails *Lymnea acuminita*. *Journal of Applied science* (**06**) 51-57.

Wanyonji, A.W., Chhabra, S.C., Mkojia, G. W. and Njue, P.K. (2003).Tarus Fitoterapia, **74** (3) 298-30

El-olemy, M.M., Farid, J.A., Abdulfatah, A.A. (1994). Experimental Phytochemistry Laboratory Manual. College of Pharmacy King Saud Universty Ryadh, pp 3-61.

Gehad, T., El- Sherbini, Rawi, A., Zayed, and Emam, T. El-sherbini.(2009). Molluscicidal Activity of some *salanum* species extract against the snail *Biomphalaria alexandrina* ; *Journal of parasitology research* vol. 2009 (2009),Aeticle ID 474360. P5 http://dx.doi.org/10.1155/2009/474360

Harbone, J.B. (1973). Phytochemical Method: A Guide to Modern Technique of plant analysis. 2nd Edition. New York: Chapman A. and Hall London, UK; pp. 278

Harbone, J.B. (1998). Phytochemical Method: A Guide to Modern Technique of plant analysis. 2nd Edition. New York: Chapman A. and Hall London, UK, pp. 278

Jorgensen, A., Kristensen, T.K., Lange, C.N., Stensgard, A.S., and Van Damme, D. (2009). *Lanistes ovum* IUCN 2011. IUCN Red list of threatened species. Version 2011.1

Maryam, O. David, K., Fanell, F. and K.A. Kemper, (1998). *Arch. Fam. Med*., 7, 523-536

Rasheed, A.A. (2002). Biological studies on the snail intermediate hosts of schistosomiasis from *Calendula mircantha* offinalis on using larval *Echinostomes* as biocontrol agent against larval *schistosomes* and snail. *Egypt Journal of science parasitology*., **32**: 775-784.

Raw, I S.M., Al-Hazm,i M., and Seif Al Nassr, F. (2011). Comparative study on the molluscicidal activity of some plants extract on the snails vector of *Schistosoma mansoni*, *Biomphlaria alexandrina*. *International journal of Zoological Research*, 7: 169-189

Revathi, P., Jeyaseelan, S.T., Thirumalaikolundusubramanian, P., Manickarasagam, S., Prabuhu, N., (2015). A comparative mechanism of Antidiabetic role of various extracts of *Bruguriera cylindrica* leaves. World journal of pharmacy and pharmaceutical science. **5**: 1168-1176

Raunelli, Francisco and Sergio, Gonzalez. (2009). Strategic control and prevalence of Fasciola hepatica in Cajamaca, Peru. A pilot Study, *Int J Appl Res Vet Med*, **7**(4), 145-152

Singh, S.K, Singh, A. (2013). Molluscicidal and anticholinesterase activity of *Alstoniascholaris* plants against freshwater snail *Lymnaea acuminate*. *Pak*istan *Journal of Biological Science*, **6:** 1442-1446

Sofaworo, A., (2008). Medicinal plants and Traditional Medicine in Africa 3rd Edition. Spectrum books ltd. Ibadan, Nigeria, pp: 199-203

Alves, T.M., Silver, A.F., Brandao, M. T.S. (2000). Grandi, J. Smania and C.L. Zani, mem. Inst. Oswaldo. cruz., **95** (3), 367-73

Vennervald, B.J and Dunne, D.W. (2004). Morbidity in schistosomiasis: An update. Current opinion in infectious diseases, 17(5): 439-47

WHO, (1993). The control of Schistosomiasis. Second Report of the WHO Expert committee. WHO Technology Report Geneva. P 830.

WHO, (2012). Officail WHO health days Meeting and consultations. P 516