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Research Article

THE EFFECT OF PLANT EXTRACT ON THE GROWTH OF *BULINUS* (*PHYSOPSIS*) *GLOBOSUS*

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ABSTRACT

Studies (in-vitro test) to reveal the molluscicidal effects to aqueous extract of *Tetrapleura tetraptera* on the growth of *Bulinus* (*physophis*) *globosus* was carried out in the laboratory. The results showed that the efficacy of *T. tetraptera* extract on the mortality of *B. globosus* varied with its concentrations. At 25% concentration of *T. tetraptera* extract, it was observed that seven hundred and seventy-seven (777) snails were found dead at one hour exposure representing 3 8.9% mortality rate. At 100% concentration of *T. tetraptera* extract, which was the highest, one thousand, two hundred and thirty-three (1,233) snails were found dead at one hour exposure representing 61.6% mortality rate. There was no significant difference ($t = 0.018$; $P>0.05$) between the mortality rates at 50% and 75% level of concentrations. However, there was a significant different ($t = 1.05$; $P<0.05$) between the mortality rates at 75% and 100% level of concentrations with minutes exposure. It was also highlighted that the toxicant of *T. tetraptera* could be used in low doses at transmission foci to reduce schistosome infection in snails.

Keywords: *Tetrapleuratetraptera*, *Bulinusglobosus*, Extract concentrations, Mortality.

INTRODUCTION: Many plants namely *Solanum nigrium, Phytolacca dodecandra, Euphorbia spleendens and Tetrapleura tetraptera* have been shown to have molluscicidal potency on the growth of snails (Adewumi, 2006). *T. tetraptera*belong to the family of fabaceae which are commonly known as Aridan in South West Nigeria, with a single stemmed, robust, perennial tree of about 30m with dark green leaves, thick, woody base and spreading branches. The plant has a wide natural distribution over a large part of tropical Africa, especially in the rain forest belt of West, Central and East Africa (Ojewole, 2004). The use of *T. tetraptera* in the community-based on schistosomiasis control programmes may be better received by the community than the synthetic molluscicide, this is because synthetic molluscicide pollute water bodies more easily which could cause damage to the organisms living and using the water (Aderemi, 2007).

Snail hosts of schistosomes occur in shallow water near the share of lakes ponds, marshes, streams and irrigations channels. People acquire schistosomiasis through repeated contact with fresh water during fishing, farming, swimming, washing, bathing and recreational activities (Adewole, 1997; Adewole and Olofintoye, 2004). The abundance of *T. tetraptera* in this part of the country (Nigeria) occasioned this work on the impact of this plant extracts on the growth of *Bulinus* (*Physopsis*) *globosus*, the intermediate host of *Schistosoma spp*.

MATERIALS AND METHODS

Collection and preparation of plant extract

Leaves part of *T. tetraptera* were collected from Botanical garden of Plant Science Department, University of Ado-Ekiti, Ekiti State. The leaves were sun dried for two weeks. Thereafter, the leaves were pulverized in a wood mortar with a pestle, 50 gm of the blended leaves were soaked in 500 ml of distilled water and mixed thoroughly and left for five hours until blended leaves dissolved, which eventually represent the stock solution for blended extract.

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Preparation of graded concentrations of the extracts: Different concentrations of 25%, 50%, 75% and 100% were prepared for stock solution of blended extract of the plant leaves as shown below; the 25% extract concentration was prepared by diluting 25ml of blended stock solution with 75m1 of distilled water. The 50% extractconcentration was prepared by diluting 50ml of blended stock solution with 50ml of distilled water. The 75% extract concentration was prepared by diluting 75ml of blended stock solution with 25 ml of distilled water. 100ml of blended stock solution which was undiluted with distilled water that represents 100% extract concentration samples. Finally, 100ml of distilled water was used as a control for the experiment without blended stock concentrations added.

Species of snails used: *Bulinus* (*Physopsis*) *globosus* were used as experimental snails. These snails were collected from Omo-osuo stream located at Iworoko-Ekiti. The snails numbering Ninety-five (95) were maintained as stock cultured in glass aquaria filled with water collected from that particular stream, the water were changed every 2-3 days and kept at mean temperature of 26°C. The snails were fed with boiled *Talinum triangulare* (water leaf). After about four (4) weeks of cultured, the wild snails laid eggs and hatched within 2 weeks at the temperature of 28°C. The first generations of these snails were used as experimental snails. A total of four big glass aquaria were used with each containing two thousand (2,000) snails (first generation).

The in-vitro test: In-vitro test were carried out to investigate the molluscicidal effects of extract from leaves of *T. tetraptera* at different concentrations and minutes interval of exposure on the test snails *B. globosus* used. Snails between 150-200 were placed into four big glass beaker, which contains 25%, 50%, 75% and 100% of blended extract concentrations and also, there were another four big glass beaker containing distilled water used to, know the mortality rate of the snails.

The molluscicidal effects of the leaves of *T. tetraptera* were evaluated in terms of the mortality of the snails. The percentage mean mortality of the snails wascalculated as: The

$$\frac{\text{Number of dead snails}}{\text{Total Number of snails used}} \times 100$$

Statistical means were also employed to compare the mortality rate with respect to concentrations and minutes.

RESULTS

The table 1 below showed the molluscicidal effect of *T. tetraptera* extracts on the growth of *B. globosus* of the 8,000 snails used, 4,006 died irrespective of the concentrations representing 50.1% mortality.

Table 1. Concentration of aqueous plant (*T. tetraptera*) extract and mortality rate.

Time	Percentage of leaf aqueous plant extract				Mortality Rate				Death	Survival
	25%	50%	75%	100%	25%	50%	75%	100%		
5 min	150	150	150	150	40	48	67	79	234	366
10 min	150	150	150	150	42	50	68	81	241	359
15 min	200	200	200	200	49	58	74	90	271	529
20 min	150	150	150	150	43	56	72	85	256	344
25 min	150	150	150	150	51	62	79	97	289	311
30 min	200	200	200	200	67	75	89	98	329	471
35 min	150	150	150	150	70	81	92	102	345	255
40 min	150	150	150	150	73	86	98	109	366	234
45 min	200	200	200	200	80	91	101	114	386	414
50 min	150	150	150	150	83	99	108	120	410	190
55 min	150	150	150	150	85	101	112	127	425	175
1 hr	200	200	200	200	94	112	117	131	454	346
Total	2000	2000	2000	2000	-	-	-	-	-	-
Control	50	50	50	50	777	919	1077	1233	4006	3994
			Total	Percentages	38.85	45.95	53.85	61.65	-	-

It was observed that the rate of mortality increases with increase in the concentrations level and minutes of exposure. At 100%, concentration of *T. tetraptera* extract, one thousand, two hundred and thirty-three (1,233) snails died at one hour exposure representing 61.6% mortality rate. At 75% concentration of the *T. tetraptera* extract, one thousand and seventy-seven (1,077) snails died at one hour exposure representing53.9%. At 50% concentration of plant extract, Nine hundred and nineteen (919) snails were found dead at one hour exposure representing 46.0%. Also, at 25% concentration of plant extract, seven hundred and seventy-seven (777) snails died at one hour exposure representing 39.0% (Table 1). There was no significant difference ($t = 0.018$; $P>0.05$) between the mortality rates at 50% and 75% level of concentrations respectively. However, there was a significant difference (t 1.05; $P<0.05$) between the mortalityrates at 75% and 100% level of concentrations with one hour exposure. The result of this study showed that none of the snails in the control beaker were found dead, 100% of the snails remained alive after the introduction of the distilled water.

DISCUSSION

The use of natural products in the therapy throughout the world is increasing, as well as the interest for research in this area. The biodiversity health especially in Nigeria has stimulated and focused research into new naturally derived drugs and this interest has extended to focus on the field of vector control (Sukumaran, 2007). The search for effective molluscicides at lower costs and with less impact on the environment has stimulated rigorous active research for potential active substances that can be derived from renewable parts of plants (leaves) without hindrance in endemic areas (Adewumi, 2006). The results obtained from this study showed that extracts from the *T. tetraptera* have molluscicidal effect on the control of snail intermediate host of schistosomiasis. The results also indicated that various life activities of the snail *B.globosus* were paralyzed on introduction of extract concentration and the percentage mortality record at the end of one hour exposure to various concentrations were high. The importance of using extracts from *T. tetraptera* which is a natural product that is locally abundant in the control of snail intermediate host of schistosomiasis is enormous and this economic factor is of crucial importance in many regions endemic for schistosomiasis (Ariwodola, 2008).

The molluscicidal effects of extract from the leaves of *T. tetraptera* had significant mortality effect impacts on the test snails *B. globosus*. This experiment carried out to investigate the use of plant extract to control snail intermediate host of schistosomiasis tally with other investigators who used different plant extract in such control (Amrita, 2007). The significant mortality effect of the plant extract on the snails used was probably due to the presence of active substance, triterpeniod (Iwalewa and Adebanjo, 2009).

CONCLUSIONS

Based on the outcome of this research, the use of extract concentrations from *T. tetraptera* should be encouraged especially in areas endemic for schistosomiasis since the plant is locally abundant and the mode of extract preparation is easy and inexpensive. When this is done, it would be a means of activating the effectiveness of this substance as a molluscicidal agent that can be used to control snail intermediate host of schistosomiasis. Finally, Educational programmes can be developed to encourage villagers particularly health committee members or relevant volunteers, to out routine periodic tasks needed to ensure that these plants are grown, prepared and applied appropriately to the habitat.

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