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Effect of stem- extract of *Adenia cessampeloides* on malondialdehyde (MDA) and superoxidedismutase(SOD) in *claria patrichus* (fishes)

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Abstract: *Adenia cessampeloides is a popular plant whose stem is used as fish poison by the local people in Ohaukwu local government area of Rivers- state in Nigeria. Its leaves are however, consumed locally for its high nutrient quality. Here, the Adenia cessampeloides stem aqueous extract on malondialdehyde(MDA) and superoxide dismutase(SOD) in Clara patrichus(fishes) were studied using standard methods. The results showed that MDA decreased as the concentration of the extract increased and SOD activity also increased as the concentration of the extract increased. The results also showed that oxidative stress or cellular damages might be prevented by use of the plant stem extract.*

Keywords: *Effect of mda, Effect of sod, Adenia Cessampeloides, Nigeria.*

I. Introduction

The plant *Adenia cessampeloides* is an economically important plant that belongs to the family of cessalpiniaceae that is used for fish harvesting in ponds of water, streams, etc (2). It is also a fish poison when macerated and immersed in water because it kills fishes, more especially when it is fresh (2). It is greenish in colour and has brown stems. The plant is found in many places in Ebonyi State. The leaves of the plants also have high nutritional quality when consumed.lipid hydroperoxides are non-radical intermediates derived from unsaturated fatty acids, phosphplipids, glycolipids, cholesterol esters and cholesterol itself (33). Their formation occurs in enzymatic and enzymatic reactions involving activated chemical species known as "Reactive oxygen species" (ROS) which are responsible for toxic effects in the body through various tissues damages. These Reactive Oxygen Species include among others hydroxyl radicals,single oxygen, lipid oxyl or peroxyl radicals and peroxylnitrite formed from nitrogen oxide(NO), all these groups of atoms behave as a unit and now named free radicals(21). Superoxide dismutase (SOD) is metalloenzymes that catalyze the dismutation of superoxide radical into hydrogen peroxide and molecular oxygen and consequently provide an important defence mechanism against superoxide radicals' toxicity (16). Oxidative stress dependent upon superoxide radical can account for a number of acute and chronic disease states, include inflammation and ischemia-reperfusion. SOD protects murine peritoreal macrophages from apoptotosis induced by adriamycine. Furthermore, SOD promotes cell differentiation. Malondialdehyde (MDA) is formed also in some tissues by enzymatic processes with prostalglandin precursors as substrates (6). Thus, thromboxane synthetase generates MDA with thromboxane from prostaglandia endoperoxides during human platelete activation (10). It has also been proposed that MDA could react physiologically with several nucleosides (deoxy-ginosine cytidine). Aldehydes are in general the most important molecules responsible for the off-flavour in oxidized food for edible oils (31).

1.1Fish poison

Fish poison is a way of harvesting fish from a waterhole by using leaves which gives-off obnoxious substances when soaked in water (14). This stuns the fish making them drunk so that so that they float to the surface or onto the bank where they can be collected. Fishes collected this way are safe to eat (19). Fish poisons are widely used like curae poison (Chondocendrum tomentosum),piscicides were commonly used,saponinins which are active in the stem also contains a glucoside poison which is very effective in catching fishes. The retonones are also fish poisons found in many leguminous plants like mimosaceae, cesalpiniaceae and more commonly in the family of fabaceae.(19)

II. Materials and methods

2.1.1 Sample collection

The fishes were sacrificed hourly depending on the effect of the concentration of the extract. The blood was collected by using surgical blade to open the thoraxic cavity, sterilized syringes were used to collect the blood into different test tubes according to the effect of the concentration of the extracts and centrifuged immediately at 3000rpm for 10 minutes and the supernatants were used for analyses.

2.2 Extraction method

A 400g weight of the Adenia cissampeloides stem was macerated or soaked in 400ml of water, the maceration or soaking took 24 hours, this was filtered and then water and extracts reweighed (8).

Assay for lipid peroxidation(MDA)(20)

Principle

The chromophoric reaction between malonic aldehyde and thiobarbituric acid was monitored spectrophotometrically at 530nm with increasing absorbance monitored against the blank.

Procedure

The blood was centrifuged to get the supernatant for the analysis. The test tubes were set in double for each sample in other to get the mean value (for $A=a_1, a_2$). O.1ml of the sample was added into all the test tubes. 0.9ml of distilled water was added also to the tubes. O.1ml of 10% triton-X-100 was added to the tubes. 0.5ml of 25% TCA was added also to all the test tubes, 0.5ml of 1% TBA in 0.3% of NaOH was also added in all the test tubes. The solution in the test tube boiled for 40minutes and then left to cool. Thereafter, it was centrifuged for 5 minutes and the absorbance taken at 523 and 600nm, in other to avoid unnecessary interferences.

Assay for superoxide dismutase activity (16)

Principle

The ability of SOD to inhibit the autoxidation of adrenalin was the basis of SOD assay. Superoxide generated by xanthine oxidase reaction is known to cause the oxidation of adrenalin to adrenochromic oxide forming pink colour which was read against the blank at 532nm.

Procedure

The test tubes were set in double per each sample in other to get the mean value.
2ml of the sample were put in all the test tubes.
2.5ml of 0.05 phosphate buffer of pH 7.8 was put in all the test-tubes.
Addition of 0.3ml of freshly prepared adrenalin solution was also added to all the test tubes.
The absorbance was taken spectrophotometrically at 480nm in 30seconds and 150 second respectively.

III. Figures And Tables

Table 1: Percentage of Claria patrichus (Fish) alive after Adenia cessampeloides extract exposure

TIME OF EXPOSURE	CONCENTRATIONS (g/l)				
1hr	100	1.25	2.5	5	10
1hr 15mins	100	67.3	1000	67.3	67.3
2 hrs	100	67.3	67.3	33.3	33.3
3 hrs	100	67.3	33.3	0.0	0.0
4 hrs	100	33.3	33.3	0.0	0.0
6 hrs	100	33.3	0.0	0.0	0.0
48 hrs	100	0.0	0.0	0.0	0.0

The table above shows the percentage of Claria patrichus (fishes) alive after Adenia cesampeloides extract. An increase in contraction of the extract, results to higher toxicity in the fishes.

Table 2: Effect of Adenia cessampeloides extract exposure on MAD in fishes (Claria patrichus)

Concentration of the Extract	48hr	10hrs 15mins	8hrs 15mins
(G/L)	MDA CONCENTRATION (g/L)		
0.00	88.76	88.73	88.73
1.25	19.07	65.21	66.29
2.5	37.92	42.48	47.89
5.0	2.96	3.22	18.87
10.0	4.63	27.01	40.99

The above table shows the effect of the extract on the MDA concentration in the fishes, as the concentration of the extract is increased, the concentration of MDA decreased.

Table 3: Effect of Adenia cesampeloides extract exposure on SOD in fishes (Claria patrichus)

Concentration of the Extract	48hr	10hrs 15mins	8hrs 15mins
(G/L)	SOD CONCENTRATION (g/L)		
0.00	6.38	6.38	6.38
1.25	0.82	3.62	11.99
2.5	6.59	31.73	35.44
5.0	4.69	19.29	40.39
10.0	5.39	11.63	43.46

The above table shows the effect of the extract on the SOD concentration in the fishes, as the concentration of the extract is increased, the concentration of SOD activity also increased.

IV. Result and Discussion

The study on the effects of Adenia cessampeloides extract on the lipid peroxidation product in fishes (Claria patrichus), showed a significant decrease in malondialdehyde (MDA) concentration (Table 4.2) as the concentration of the extract increased. On the hand, the level of superoxide dismutase (SOD) activity increased significantly (table 4.3) ($p<0.005$) as the concentration of the extract increased in the medium. To an extent, this result shows that Adenia cessampeloides could inhibit lipid peroxidation. The increase in SOD activity with the concentration of the crude extract increased has shown the potential of the plant extract to inhibit oxidative stress which is associated with aging process. SOD inhibits free radical chain reaction, a process that has been linked to increase neurodegenerative processes as neurological diseases like retarded brain growth and retention.

From the results, it also shows that the plant has anti-oxidant properties which are able to prevent lipid peroxidation and oxidative stress. It means that the plant is a rich source of micronutrient especially vitamin C, vitamin E, folic acid, copper and zinc which are major anti-oxidants in the system.

V. Conclusion

It has been established that Adenia cessampeloides is a fish poison and could be used for fish harvesting based on the concentration. It was also discovered that it killed fishes easier if used wet. Our results also showed that Adenia cessampeloides stem extract reduced malondialdehyde (MDA) level but induced superoxide dismutase (SOD) activity in the serum of the fishes.I recommend that more research be carried out to establish the biochemical basis of Adenia cessampeloides poisoning ability and some of the phytochemicals. With high concentration of Adenia cessampeloides, large amount of fishes can be harvested for commercial purpose.

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