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Comparative effect of chronic administration of chloroquine phosphate and methanol extract of *Landolphia owariensis* on the activities of rat enzymes

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ABSTRACT

Medicinal plants and drugs are usually abused through wrong dose usage. These practises may pose a great health risk to the users. The objective of this work is to compare the effect of chronic administration of extract of *Landolphia owariensis* and Chloroquine phosphate on the activities of enzymes in the kidney, liver, and serum. The methanol extract of *Landolphia owariensis* and Chloroquine phosphate were administered orally to albino rats on daily doses of 250mg/kg and the activities of enzymes were monitored for 12 days. A total of 36 albino rats were divided into three. Chloroquine phosphate was administered to 12 rats, *Landolphia owariensis* was administered to another 12 rats and saline solution was administered to the remaining 12 as control. The results revealed that the rats administered with *Landolphia owariensis* showed an insignificant increase in alkaline and acid phosphatase activities in both liver and kidney. The activity of enzymes in the liver and kidney decreases significantly with chloroquine administration $P < 0.05$. The comparative studies of the chloroquine and *Landolphia owariensis* extract showed that chronic administration of chloroquine has detrimental effect on tissues, while the chronic administration of *Landolphia owariensis* extract causes little or no damage to the tissues.

Key words: *Landolphia owariensis*, kidney, liver, serum, chloroquine phosphate, alkaline

INTRODUCTION

Landolphia owariensis p. beav. or vine rubber, a family of apocynacea is a typical plant found in South Africa, Madagascar and various part of Nigeria. The local names are 'Ciwo' or 'kuranga' in Hausa, 'mbaoruto-isi' in Igbo and 'akitipa' in Yoruba language. The leaves was found to have antiulcer and antisecretory effect (Olaleye et al., 2008). The decoction of the leaves is locally used as purgative, antihelminthes and antimalarial. (Gill,1992). The extract contains polyphenolic compounds and anti-oxidative constituent which may be flavonoids, the presence of which may be linked with anti inflammatory and analgesic activities of the extract. Flavonoids have been reported to possess antioxidant and antiradical properties (Birs et al., 1991). It was also validated to be a useful anti microbial agent (Ebi and Ofoefule, 1997), (Nwogu et al., 2007). Tannins and saponins were also discovered to be the active principle (Owoyele, 1999). Chloroquine is a synthetic diethylamino derivative of 4-aminoquinoline used mainly to treat malaria. It is a potent blood schizonticidal drug effective against the erythrocyte form of all four plasmodia species except where a resistant strain occur. It act by blocking the enzymatic synthesis of DNA and RNA in both mammalian and protozoa cells by forming a complex with DNA that prevents replication or transcription to RNA (Slater,1993). Alkaline and acid phosphatases are marker enzymes found in specific regions of the cell, thus giving an indication of the sequence of

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cell damage. If any damage arises from the administration of chemical compound used, the level of those enzymes in the tissue following the chemical compound administration will indicate the state of the tissue cell membrane (Nwogu et al., 2008).

Many people especially the uneducated use synthetic drugs and plant extracts indiscriminately, thereby exposing themselves to liver or kidney damage. The objective of this work is to compare the effect of chronic administration of Chloroquine phosphate and extract of *Landolphia owariensis* on the activities of acid phosphatase and alkaline phosphatase in the kidney, liver, and serum.

MATERIALS AND METHODS

Chloroquine phosphate used was a product of Glaxo group limited, Greenford England.

Preparation of plant material

Plant material was gotten from a biological garden of University of Ibadan, Nigeria. It was air dried and milled to powder using a blender. The methanol extract was obtained by adding 300ml of methanol to 30g of dried and powdered leaves of the plant for 4 days. Dried extract was obtained by evaporating the solvent in a water bath maintained at 45⁰c

Experimental Animals

Albino rats (*Rattus novergicus*) weighing an average of 165g were obtained from animal holdings of Physiology Department of University of Ibadan, Nigeria.

Animal Grouping

A total of 36 albino rats housed under standard laboratory condition and fed with growers' mash and water ad libitum. The animals were divided into three groups. Group 1 consisted of 12 rats to which herbal extract was administered, group 2 consist of 12 rats to which chloroquine was administered, Group 3 was made up of 12 rats to which saline water was given to serve as the control and each of the rats was given a dose of 10mg/kg body weight for every 24 hours.

Homogenate Preparation

The rats were anaesthetized in a glass jar containing cotton wool soaked in chloroform. The rats were then removed and dissected on tray, exposing the visceral organs. The organs were removed and rinsed in 0.25M sucrose solution and weights were taken. The tissues were then homogenised in Ice cold 0.25M sucrose solution (1:5w/v) using pestle and mortal. The homogenate gotten from these tissues were kept in a labelled clean specimen bottles and frozen before enzyme analysis and protein concentration were determined.

Collection of Serum

The blood from the rat was collected into a beaker and kept in a slanting position at room temperature for about an hour and the yellowish liquid separating out from the serum was

centrifuged. The supernatant was stored and kept in the freezer for analysis.

Biochemical Analysis

The activities of alkaline phosphatase and acid phosphatase were determined using standard methods described by Balistreri and Shawl (1987). The total protein was determined using a chemistry analyzer (Ciba-Coming 550 Express Plus, USA)

Statistical analysis

Data obtained were analysed using student-t test. Values for P< 0.05 were taken to be statistically significant (Parker, 1979)

RESULT AND DISCUSSION

An insignificant ($p > 0.05$) increase in acid phosphatase and alkaline phosphatase activities in liver, kidney and serum was observed in the rats administered with *Landolphia owariensis*. While the activities of these enzymes in the liver and kidney decreased significantly ($p < 0.05$) in chloroquine administered rats. This decrease was followed by a significant increase ($p < 0.05$) in the serum.

The result revealed an insignificant decrease in the activity of acid and alkaline phosphatase in the kidney and liver of the rat when *Landolphia owariensis* extract was administered. ($P > 0.05$) This may depicts little or no damage to the tissues as confirmed by Nwogu et al., (2008). Also, The increase in activity may be due to de novo synthesis of enzymes in the tissues which may result from the actions of various contents of the extract such as flavonoids, saponins, tannins etc .

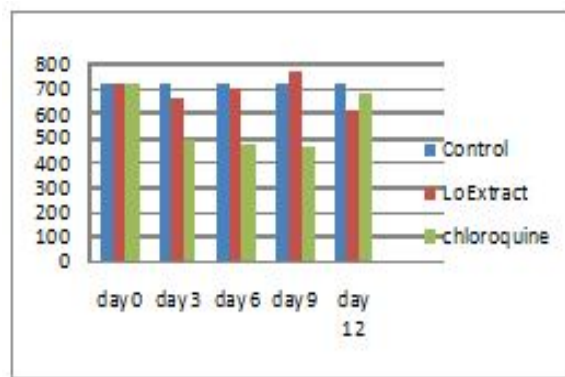


Fig 1 Effect of LO extract and chloroquine on the ACP activity in the liver.

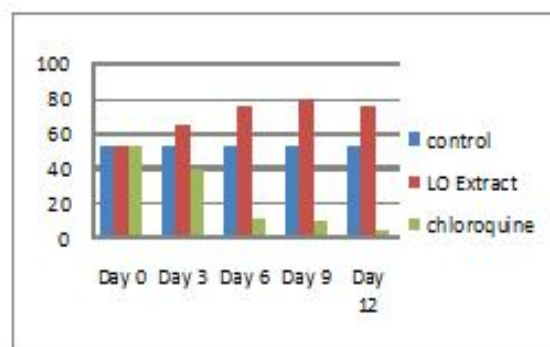


Fig 2 Effect of LO extract and chloroquine on ALP activity in liver.

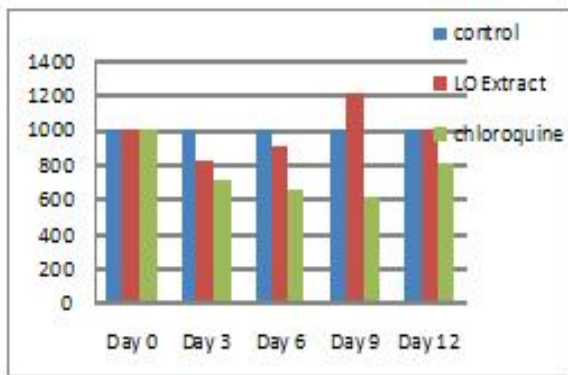


Fig 3 Effect of LO extract and chloroquine on ACP activity in Kidney.

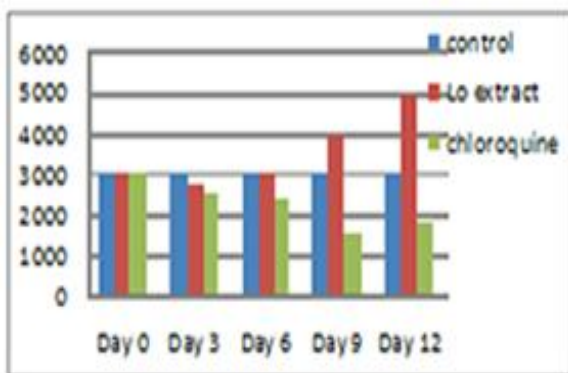


Fig 4 Effect of LO and chloroquine on ALP activity in Kidney.

CONCLUSION

The comparative studies of the chloroquine and *Landolphia owariensis* extract showed that chronic administration of chloroquine causes detrimental effect to tissues, while the chronic administration of *Landolphia owariensis* extract causes little or no damage to the tissue. Chloroquine should be used with caution in man. Chronic administration of chloroquine which may evolve from self medication of the drug should be discouraged. Alternatively, *Landolphia* extract which is not harmful despite the chronic administration may be used. This plant extract serves as antimalarial, antimicrobials, antihelminthes and purgatives and no adverse effects is observed on kidney and liver despite the chronic administration, the plant should be prevented from extinction by cultivating and preserving the existing ones.

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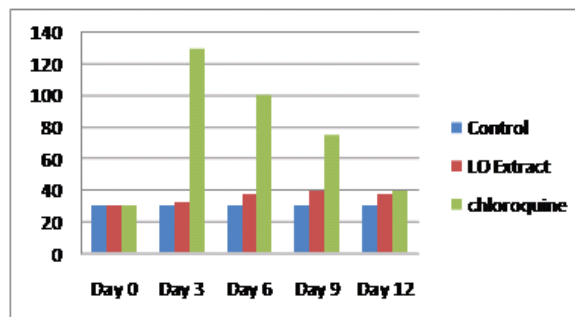


Fig. 5 Effect of LO extract and chloroquine on ALP activity in Serum.

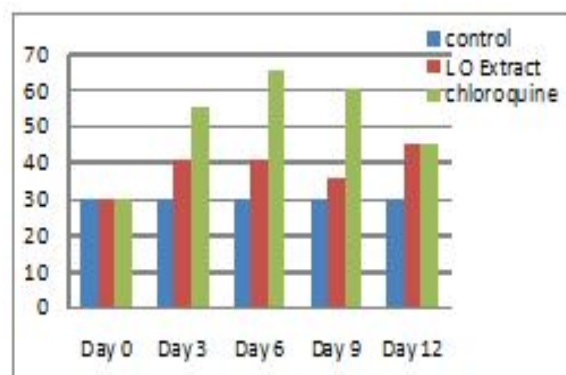


Fig 6 Effect of LO extract and chloroquine on ACP activity in Serum
LO= *Landolphia owariensis*. ACP= Acid Phosphatase ALP= Alkaline phosphatase

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