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Effects of *Gongronema latifolium* Leaf Extract on Malondialdehyde Concentration of Wistar Rats Administered With a Toxic Dose of Ibuprofen

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Abstract

Aim: To determine effects of *Gongronema latifolium* leaf extract on Malondialdehyde (MDA) levels of wistar rats induced by a toxic dose of Ibuprofen. Material and Methods: Thirty wistar rats were randomly divided into five groups with six rats in each group (n=6); Control (C) received normal feed only. T1 was administered with *Gongronema latifolium* leaf extract 50 mg/kg BW+ Ibuprofen, T2: *Gongronema latifolium* extract 100 mg/kg BW+ Ibuprofen, T3: *Gongronema latifolium* leaf extract 150 mg/kg BW+ Ibuprofen. T4: received Jbruprofen only.This lasted for fourteen days. On the 15th day, blood samples were collected and the level of MDA was then measured. Results: T1, T2, T3 showed significantly decreased MDA levels when compared with theT4 at $p < 0.05$. Conclusion: *Gongronema latifolium* extract has an antioxidant effect on the prevention of elevated MDA levels.

Keywords: Malondialdehyde; Gongronema latifolium; Leaf extract.

1. Introduction

Malondialdehyde (MDA) is a product of lipid peroxidation. It results to decreased antioxidant which is an important substance in the body because of its function in protecting the cellular component from damage caused by free radicals induced by oxidative stress [1]. One of the consequences of uncontrolled oxidative stress that is cells, tissues, and organs injury caused by oxidative damage. Malondialdehyde is one of the final products of polyunsaturated fatty acids peroxidation in the cells. An elevation in free radicals causes overproduction of Malondialdehyde. Collodel, *et al.* [2] Malondialdehyde level is referred as a marker of oxidative stress and the antioxidant status. Malondialdehyde is reactive and potentially mutagenic. It has been found in heated edible oils such as sunflower and palm oils. Corneas of patients suffering from keratoconus and bullous keratopathy have increased levels of malondialdehyde, according to one study. Malondialdehyde (MDA) is one of the most common biomarkers of oxidative stress and is used for the diagnosis of many diseases [3]. Antioxidants are substances that may protect the cells against free radicals, which may play a role in diabetes, myocardiac infarction, sickle cell and other diseases. Free radicals are molecules produced when the body breaks down food [4].

It is present in the human body for the purpose of compensating the effects of oxidants. It loses one of its electrons which neutralizes free radical substances. This is to create a stable molecule and break the free radical chain reaction. In order to avert degenerative diseases, antioxidant is needed to compensate for the damage resulting from oxidative stress. Phenolic and polyphenol substances, which can be found in many natural resources such plants, possess antioxidant properties [5]. Gongronema latifolium leaf extract contains flavonoids and tanins, substances which are rich sources of antioxidant [6]. Flavonoid activity inhibits enzymes which are involved in the creation of reactive oxygen specie. The tanin activity gives protection against free radicals, inhibit pro-oxidative enzyme and lipid peroxidation [7]. Gongronema latifolium, is a tropical rainforest plant primarily used as spice and vegetable in traditional folk medicine. The leaves are used to prepare food for mothers that have recently put to bed, where it is believed to stimulate appetite, reduce post-partum contraction and enhance the return of the menstrual cycle [8]. Some reports have demonstrated that these phytochemicals found in *Gongronema latifolium* may influence cellular proteins with enzymic activities. *Gongronema latifolium* leaf extract is used in the treatment of malaria,

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laxative, diabetes and hypertension [9]. The studies of herbal medicinal and the use of plants: leaves, stem, roots, seed and even the latex for human benefits is a age long event [10] Therefore, the present study was conducted in order to determine effects of *Gongronema latifolium* leaf extract on Malondialdehyde (MDA) levels of wistar rats induced by a toxic dose of Ibuprofen

2. Material and Methods

2.1. Plant Material and Extraction

The leaves of *Gongronema latifolium* were collected at Umuamucha Njaba Local Government Area of Imo State Nigeria. The plant was identified and confirmed in the Department of Plant Biology and Biotechnology of Imo State University Owerri. They were washed, sundried and ground into powder for use. The dried leaves of *Gongronema latifolium* were milled to get a coarse powder used for the extraction. The powder was macerated in a 400 g percolator with 250 mL of distilled water. The mixture was allowed to stand for 48 hours after it was filtered. The filtrate was then placed in an oven to evaporate and the solid residue was referred to as extract. The appropriate concentrations of the extract were made in distilled water for the experiment. Hence, the following concentrations i.e.50, 100 and 150 mg were prepared

2.2. Experimental Design

The wistar rats weighing (180-300 g) obtained from the Animal House of Imo State University were used in this investigation. The animals were kept in cages in a room and maintained at room temperature with a 12-hours light dark cycle for one week to acclimatize. The animals were randomly assigned to five experimental groups with six rats in each group.

Thirty wistar rats were randomly divided into five groups (n=6); Control (C) received normal feed only. T1 was administered with *Gongronema latifolium* leaf extract 50 mg/kg BW+ Ibuprofen, T2: *Gongronema latifolium* extract 100 mg/kg BW+ Ibuprofen, T3: *Gongronema latifolium* leaf extract 150 mg/kg BW+ Ibuprofen. T4: received bruprofen only. In all groups, the extract was administered through oral route. This treatment was performed by oral compulsion. All animal were allowed free access to food and water throughout the experiment.

This lasted for 14 days. On the 15 day, blood serum samples were collected and the level of MDA was then measured.

2.3. Blood Collection

Twenty four hours after the last doses were administered, the animals were anaesthetized with chloroform vapour, quickly brought out of the jar and sacrificed. Whole blood was collected by cardiac puncture from each animal into clean dry test tubes. The blood in the clean dry test tubes was allowed to stand for about 15minutes to clot and further spun in a Westerfuge centrifuge (Model 1384) at 10000 g for 5 minutes, serum was separated from the clot with Pasteur pipette into sterile sample tubes for the estimation Malondialdehyde.

Determination of Malondialdehyde level: The MDA level was determined using Thiobarbituric Acid Reactive Substance (TBARS) Assay [4].

2.4. Statistical Analysis

The results were expressed as mean+ standard deviation. The statistical evaluation of data was performed by using student T- test.

2.5. Results

Table-1. Levels of MDA in wistar rats that were administered with different doses of extract and ibruprofen

Groups	MDA (nmol/mL)
Control	2.281±0.76.
T1	3.573±0.92*
T2	3.210 ±0.99*
T3	3.121±*0.07
T4	4.807± 1.06*

*Significantly different from control at P<0.05

3. Discussion

The increased levels of free radicals can be triggered by the presence of toxic doses of Ibuprofen. MDA is the product of lipid peroxidation. MDA intoxicates the cells leading to disease situation [11]. Hence, antioxidant is needed to avert increased levels of MDA. Gongronema latifolium leaf extract has flavonoid and tannin which aid to prevent elevation of MDA by reducing free radicals [12]. The flavonoids and tannins bring about the induction of antioxidants in Gongronema leaf activity. This is due to the fact that flavonoid being a class of phenolic compounds can reduce free radicals. The flavonoids' antioxidant activity may prevent the enzymes involved in oxidative stress [13]. The flavonoids in Gongronema latifolium leaf can neutralize free radicals via the sacrifice of Hydrogen ions. In the same vein, flavonoids play a role as intracellular antioxidants via preventing free radical-producing enzymes such as xanthine oxidase, lipoxigenase, protein kinase C, cyclooxygenase, microsomal monoxygenase, mitochondrial sucoxyase and NADPH oxidase [14, 15]. Tannin activities as an antioxidant neutralize free radicals,

inhibiting pro-oxidative enzymes and lipid peroxidation. Tannins can decrease the oxidizing power and activity of free radicals [16].

The results obtained from this study revealed that MDA levels in the group T4 that was administered with Ibruprofen was the highest. The elevated concentration of MDA are proportional to the increase in oxidative stress and free radicals in the body. This is due to the induction of Ibruprofen toxic dose resulting in increased free radicals in the body. This is because of the absence of any active ingredients capable of inhibiting the increase of free radicals [17].

The levels of MDA in treatment groups TI, T2, and T3 was decreased compared to group T4 that was administered with Ibruprofen only.The decrease in MDA could be due to the provision of Gongronema latifolium leaf extract containing flavonoid and tannin compounds that enhance antioxidant activity. Consequently, the presence of free radicals from Ibruprofen induction toxic dose can be inhibited. The concentration of Gongronema latifolium leaf extract is proportional to its antioxidant activity [18].

Conclusion: Gongronema latifolium leaf extract at doses of 50 mg/kg BW, 100 mg/kg BW, and 150 mg/kg BWhas antioxidant effects in preventing increased MDA levels. A dose of 150 mg/kg BW is the most effective as a means of forestalling elevated MDA levels after Ibruprofen toxic dose induction

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