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Evaluation Of Transaminases Activity Of Aqueous Extract Of *Ocimum Gratissimum* In The Liver And Kidney Of Albino Rats

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ABSTRACT

The effects of aqueous extract of *Ocimum gratissimum* on transaminases activity of albino rat were investigated. The objective was to evaluate the effects of aqueous extracts of fresh leaves of *Ocimum gratissimum* on transaminases activities in albino rats. Sixteen albino rats were randomly assigned to four experimental groups of 4 marked as control group, groups A, B, and C respectively. Groups A, B and C were treated with oral administration of aqueous extract of *Ocimum gratissimum* at 100mg, 200mg and 400mg/kg body weight daily respectively for two weeks. Control group received no treatment. Results showed that treatment of rats with the respective doses of the extract did not significantly alter the serum and liver levels of ALT and AST in all test groups. There was a significant increase in the activities ($P < 0.05$) of AST and ALT in the kidney and the serum which might be caused by activation of enzymes synthesis in renal cells. The result suggests that ingestion of aqueous extract of *Ocimum gratissimum* could confer protection on the liver tissues against injury, damage or disease and the extract may not be toxic at the doses investigated.

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1. Introduction

Medicinal plants have being used for centuries before the advents of orthodox medicine. Leaves, flowers, stems, roots, seeds, fruits and back can all be constituents of herbal medicines [1]. The use of herbal products for medicinal benefits has an important role in nearly every culture on earth. Herbal medicine was practised by the ancient people of Asia, Europe and the Americas [2]. Over 50% of all modern clinical drugs are of natural product origin and natural products play an important role in drug development programmes. Medicinal plants constitute an effective source of both traditional and modern medicine. Herbal medicine has been shown to have genuine utility, and about 80% of rural populations depend on it as their primary health care [3]. In Nigeria, various plant parts are used for curing different ailments with remarkable success. Among the enormous number of these medicinal plants are members of the genus *Ocimum* L. (Lamiaceae). The genus is

represented by six species in West Africa [4]. However, only three species, *O. gratissimum* L., *O. basilicum* L. and *O. canum* Sims have been reported to have medicinal properties [5]. *Ocimum gratissimum* L. is grown for the essential oils in its leaves and stems and various research works have been designed to evaluate the various potentials of extract from the leaves of *Ocimum gratissimum* and to explore its basis for traditional use. It is against this background, that the use of plant products in human medicine has become a thing of very keen interest. The liver is the second largest organ in the body, contributing about 1/50 of the total body weight, or about 1.5 kg in the average adult human [6]. It is a large chemical reactant pool of cells that have a high rate of metabolism, sharing substrates and energy from one metabolic system to another, processing and synthesizing multiple substrates that are transported to other areas of the body, and perform other metabolic functions [6]. The activities of ALT are measured as one of the marker traceable to changes in the pathological condition of the liver. The level of serum ALT can be used as a differential diagnosis of liver and heart diseases [7]. The increase in serum ALT is considered more sensitive indicator of hepatitis and liver cell damage than AST, as the former is found in high concentrations in the liver than in the heart muscles [7]. [8] applied ALT to the

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diagnosis of liver disease. AST isozyme can be applied in the study of diagnosis of liver diseases caused by drug toxicity or by infection [9]. High level of mitochondrial AST has been observed in the sera of patients having acute and chronic cirrhosis, which may not be detected in the sera of healthy individuals [8]. Extract of *Ocimum gratissimum* has also been shown to have sedative activity [10] and to have therapeutic benefit in patients with inflammatory joint disease [11]. However, there is paucity of information concerning the toxic or adverse effect of repeated or continuous administration of aqueous preparation of *Ocimum gratissimum* on some important organs of the body such as the liver. Therefore the study aims to study the activity of transaminases in adult albino rats following administration of *Ocimum gratissimum* aqueous extract.

2. Material Methods:

Method of Sacrifice

At the end of the treatment period, the animals were sacrificed using cervical dislocation.

Extraction of plant material: Fresh leaves of *O. gratissimum* were bought in the market at Ado, Nigeria. The plant was identified and authenticated by a plant scientist in the Department of Plant Science, Ekiti State University, Ado-Ekiti, Nigeria and a voucher specimen was deposited accordingly at the herbarium of the Department of Plant Science, Ekiti State University, Ado-Ekiti, Nigeria.

Extraction: The fresh leaves of the plant were air-dried, pulverized and extracted exhaustively in distilled water. The filtrate was concentrated and evaporated to dryness at 60°C, using rotary evaporator. The yield was calculated and the dry extract was stored in a refrigerator at -4°C until use for the experiments.

Animals: A total number of 16 albino rats weighing between 100-190 g were used in this study. The animals were obtained from the animal house of the Department of Chemical Sciences, Afe Babalola University, Ado-Ekiti, Nigeria. The animals were randomly distributed into cages and allowed to acclimatize for 14 days in a well ventilated room at a room temperature of 28.0±2.0°C under natural lighting condition. The animals were allowed free access to standard rat chow (Topfeeds Ltd., Ado-Ekiti, Nigeria) and tap water ad libitum.

Experimental protocol: Animals were divided into four groups- A, B, C and control group respectively. Group A was given single daily doses of 100 mg kg⁻¹ of OG for 14 days. Group B received single daily doses of 200 mg kg⁻¹ of OG for 14 days. Group C was given single daily doses of 400 mg kg⁻¹ of OG for 14 days. The control group (group D), containing four animals, was given only distilled water daily for 14 days. OG was administered orally using a calibrated 1 mL syringe with attached polythene cannula. At the end of the treatment period, the animals were sacrificed using cervical

dislocation. Blood samples were collected into lithium heparinized sterile bottles. These were used for biochemical assay of alanine aminotransaminase (ALT) and aspartase aminotransaminase (AST) following the methods of [12] and [13].

Statistical analysis: Data were expressed as Mean±SEM of mean. Comparisons between control values and values of treated groups of albino rats were performed with one-way Analysis of Variance (ANOVA). Statistical significance was set at p<0.05.

3. Results

Table 1: ALT Activity (U/L) of Liver, Kidney and serum of Rats administered with *Ocimum gratissimum* for 2 weeks.

Tissues	Control	Group 1 (100mg/kg)	Group 2 (200mg/kg)	Group 3 (400mg/kg)
Liver	103.25±2.18 ^a	114.55±2.23 ^b	113.75±0.38 ^b	101.05±2.00 ^a
kidney	52.45±4.18 ^b	36.30±4.80 ^a	73.73±4.97 ^c	69.10±2.03 ^c
Serum	10.50±0.77 ^a	24.75±3.50 ^b	56.50±5.75 ^c	54.00±1.58 ^c

Values are expressed as mean of three determinations ± SEM Row values with different superscripts are significantly (p<0.05) different

Table 1 shows the ALT Activity (U/L) of liver, kidney and serum of rats fed on *O. gratissimum* meal-based diet for 2 weeks. Significant (p<0.05) difference was observed in the ALT activities in liver of rats administered with *O. gratissimum* extract when compared with those of the control. Though, significant (p<0.05) increase and decreased was also observed in the ALT activities in the kidney of rats administered with *O. gratissimum* when compared with those of the control group.

However, significant (p<0.05) increase was observed in the ALT activities in serum of rats administered with *O. gratissimum* when compared with those of the control group.

Table 2: AST Activity (U/L) of Liver, Kidney and serum of Rats administered with *Ocimum gratissimum* for 2 weeks.

Tissues	Control	Group 1 (100mg/kg)	Group 2 (200mg/kg)	Group 3 (400mg/kg)
Liver	59.93±0.13 ^a	68.83±1.22 ^b	66.00±1.55 ^b	68.93±0.47 ^b
kidney	56.88±1.60 ^a	63.05±4.35 ^a	55.00±2.03 ^a	72.15±0.10 ^b
Serum	21.60±1.22 ^a	25.18±0.38 ^a	61.13±4.36 ^b	64.78±2.67 ^b

Values are expressed as mean of three determinations ± SEM Row values with different superscripts are significantly (p<0.05) different

Table 2 shows the AST Activity (U/L) of liver, kidney and serum of rats administered with *O. gratissimum* extract for 2 weeks. When compared with those of the control, significant ($p < 0.05$) increase was observed in the activities of AST in the liver of rats administered with *O. gratissimum*, but there was no significant ($p > 0.05$) difference in the activities of AST in the three groups.

When compared with those of the control group, significant ($p < 0.05$) increase and decrease were observed in the activities of AST in the kidney of rats administered with *O. gratissimum*.

4. Discussion

The measurement of the activities of 'marker' or diagnostic enzymes in tissues and body fluids play a significant and well known role in diagnostic disease investigation and in the assessment of drug or plant extract for safety/ toxicity risk [14]. Most of the enzymes tests used in diagnostic or as markers for cellular damage depend on the very high concentration of such enzymes within the cell relative to that in plasma or serum. Consequently, cellular damage arising from drug or chemical toxicity and diseases often result in measurable increase in enzyme activity in the extracellular fluid as the enzyme is released from the damage cell. Their presence in the serum may give information on tissue injury or organ dysfunction [15]. Aminotransferase which include Alanine aminotransferase (ALT) otherwise referred to as glutamate pyruvate transaminase (GPT) and Aspartate aminotransferase (AST) otherwise referred to as glutamate oxaloacetate transaminase (GOT) are enzymes located in the cytosol and mitochondria where they are involved in the transfer of amino group from α -amino to α -keto acids. They are also involved in the biochemical regulation of intracellular amino acid pool [16]. These aminotransferase belong to the plasma non-functional enzymes which are normally localized within the cells of liver, heart, kidney and muscles. Their presence in serum may give information on tissue injury or organ dysfunction [15]. Blood and tissues levels of ALT and AST can be used to assess the toxic impact of chemical compound. Significant increase observed in the ALT activity of the liver of rats administered with *Ocimum gratissimum* extract compared to the control diet might be due to de novo synthesis of the enzymes or sharp increase in the metabolic activities of the liver in response to the administered extract. The reduction in the liver ALT activity following administration of the extract for to group 3 (400mg/kg) may be attributed to reduced rate of synthesis of the liver enzyme. It may also be that the extract has caused leakage of the enzyme into the blood via altered membrane permeability [17].

Cellular damage arising from plant extract administration can result in leakage of the marker enzymes to the extracellular fluid. However, significant increase in the ALT activities in the serum of rats administered with *Ocimum gratissimum* extract compared to the control diet might confirm that damage has been inflicted on the plasma membrane of the liver which might lead to the compromise of its integrity [18].

A significant increase ($p < 0.05$) in AST activity in the liver of rats administered with *Ocimum gratissimum* extracts compared to the control diet. This result may signify that the liver is intact and increase in AST activities observed in the liver may be due to de novo synthesis of the enzymes [19]. Generally decrease in ALT and AST in the serum may perhaps suggests that the administered extract confer protection on the liver tissues against injury, damage or disease, which are often the direct cause of elevation of the enzymes in the blood stream [20]. The fact that the levels of ALT and AST in liver, kidney and serum of both control and treated groups were similar implies that *Ocimum gratissimum* may not pose any toxicological threat to the liver when used in traditional medicine at the doses investigated.

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AUTHORS' CONTRIBUTIONS

The contributions of each author's are Mr. O.A Ojo carried out the experiment and performed the statistical analysis, Dr. (Mrs) O.I. Oloyede designed the study, Mr. Ajiboye, B.O. managed the analyses of the study, and Mr. O.I Olarewaju managed the literature searches. All authors's read and approved the final manuscript.

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