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.

1. Introduction

Medicinal plants have been used for centuries before the advents of orthodox medicine. Leaves, flowers, stems, root, 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 markers 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 aspartate 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.

<table>
<thead>
<tr>
<th>Tissues</th>
<th>Control (100mg/kg)</th>
<th>Group 1 (200mg/kg)</th>
<th>Group 2 (400mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>110.5±2.00</td>
<td>113.75±0.38 (^{a})</td>
<td>101.05±2.00</td>
</tr>
<tr>
<td>kidney</td>
<td>52.45±4.18 (^b)</td>
<td>36.30±4.80</td>
<td>69.10±2.03 (^{a})</td>
</tr>
<tr>
<td>Serum</td>
<td>10.50±0.77</td>
<td>24.75±3.50</td>
<td>54.00±1.58</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Tissues</th>
<th>Control (100mg/kg)</th>
<th>Group 1 (200mg/kg)</th>
<th>Group 2 (400mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>59.93±0.13 (^a)</td>
<td>68.83±1.22 (^{a})</td>
<td>68.93±0.47 (^{b})</td>
</tr>
<tr>
<td>kidney</td>
<td>56.88±1.60 (^{a})</td>
<td>63.05±4.35</td>
<td>72.15±0.10 (^{a})</td>
</tr>
<tr>
<td>Serum</td>
<td>21.60±1.22</td>
<td>25.18±0.38</td>
<td>64.78±2.67</td>
</tr>
</tbody>
</table>

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) increased were 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) increased and decreased 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 increased 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 [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.

ACKNOWLEDGEMENTS

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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.

5. Reference


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