



## HISTOPATHOLOGICAL STUDIES OF LIVER FUNCTION IN RATS FED ON GINGER LILLY CORM MEAL

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Received -20-05-13; Reviewed and accepted -21-05-13

### ABSTRACT

The effect of feeding *Gladiolus unguiculata* corm on a few liver function markers were evaluated in this study using albino Wistar rats. Twenty rats were randomly divided into four groups of five rats each. Various concentration of *G. unguiculata* formulations were fed to the test groups excluding the negative control which received normal feed for the 28 days of analysis. At the end of the feeding period the levels of the serum liver function markers of Aspartate aminotransferase (AST), Alanine aminotransferase (ALT), Alkaline phosphatase (ALP) and Protein were determined. Mean serum liver function markers were all increased when compared with the control with only AST liver marker deviating. The ALT activity increased from 36.0 + 3.16 in the control to 38.0 + 3.16 in 20%. The AST significantly increased ( $p < 0.05$ ) from 66.0 + 3.16 in the 20% to 88.0 + 3.16 in the control group. ALP significantly increased from 47.0 + 3.16 in the control group to 56.0 + 3.16 in 20%. Protein also increased from 7.0 + 0.316 in the control group to 7.8 + 0.316 in 20%. The results emanating from this study suggest that *Gladiolus unguiculata* corm formulations might have some deleterious effects on the liver function.

**Keywords:** Liver markers, *Gladiolus unguiculata*, Wistar rats, Protein and Feed formulations.

### INTRODUCTION

*Gladiolus unguiculata* (*Iridaceae*) is one of the most widespread *Gladiolus* species, from the family of *Iridaceae* extending from Senegal and Gambia to Sudan. It also extends southwards to Angola and South Africa. Fairly common throughout its distribution range and a conspicuous element of the pre-rain or early wet season flora (Goldblatt, 1998). *Gladiolus unguiculata* is a perennial herb, which grows from corms (Goldblatt, 1993). The leaves develop on separate shoots after flowering, 18 flowers in the inflorescence, varying in colours from deep purple on the upper petals to nearly white on the lower petals, each marked with a dark spear-shaped blotch. Viewed from the side, the flowers show a typical "window" between the upper and lateral petals (Goldblatt, 1998).

Flowering in *Gladiolus unguiculata* occurs at the end of the dry season or early in the wet season, around October to December in south tropical Africa. The absence of foliage leaves on flowering stem combined with the erect spike of small flowers with distinctively windowed in profile makes this species easy to recognize. The flowering stem bears 2-3 fairly short, non-overlapping sheathing leaves, while true foliage leaves are produced on separate shoots from the same corm toward the end of the flowering cycle (Hyde *et al.*, 2012).

It has a variety of common names such as asro (Sahoué) by the Benin indigenes (Adjanohoun *et al.*, 1989), corn flag by South Western Nigerians (Abo *et al.*, 2008). *G. unguiculata* is an African medicinal plant recorded in the human pharmacopoeia (Desouter, 1991). *G. unguiculata* has been used in Africa in treating a variety of ailments, including diarrhea and colds. It is a common component of the African herbalist's medicine. Many African herbalists consider the *Gladiolus* to be a magical medicinal plant as it is capable of treating dysentery, constipation and diarrhea simultaneously (Goldbatt, 1998). Ethno-botanical information has also noted that the *Gladiolus* is widely used throughout sub-Saharan Africa and is one of the best natural human system regulators known to man (Desta, 1994). Patients feel well when taking *G. unguiculata*, and it is often prescribed as a booster for patients with low energy levels and for hypochondriacs (Tadesse, 1994).

In this study, the effects of *G. unguiculata* corm on the histopathological and liver markers were analysed.

### MATERIALS AND METHODS

The Ginger lily corms were collected from Makurdi, capital city of Benue state, Nigeria. The corm was identified by Mr A. Ozioko of

Bioresources Development and Conservation Programme, (BDPC), Aku Road, Nsukka, Enugu state, Nigeria. The animals (Wistar albino rats) were also collected from the University of Nigeria Nsukka (UNN) Veterinary Medicine Department. Matured Wistar albino rats of both sexes obtained from the laboratory units of the faculty of Veterinary Medicine, University of Nigeria, Nsukka were used for the experiment. The animals were kept in a well ventilated stainless steel cages at room temperature of about Normal growers. Clean drinking water was also, provided to the animals until the time of the experiment. The animals were allowed 1 week for acclimatization before the experiment and ethical rules guiding the use of laboratory animals according to Zimmerman (1983) was strictly followed.

### PREPARATION OF GINGER LILY CORM FOR ANIMAL FEEDING

The ginger lily corm was washed and cut into bits by hands. The bits (ginger lily corm) was sun dried for three (3) days, after which a mechanical grinder was used to grind the dried bits into powdered form and stored at room temperature (25°C).

### GINGER LILY CORM MEAL PREPARATION

The dried ground ginger lily corm was mixed at different percentages (5, 10 and 20%) with the normal feed for the different groups of the test rats while the control group had normal feed.

### COLLECTION OF BLOOD SAMPLES

After 28 days, the rats were sacrificed by dazing and the blood was collected through cardiac puncture. The blood collected was centrifuged at 3000rpm for 10 minutes after which the serum was collected and kept in the refrigerator at -20°C until when needed.

### CHEMICALS

All the chemicals used in this study were of analytical grade.

### BIOCHEMICAL ANALYSIS

Standard conventional methods were employed in the laboratory analyses of the liver function markers and histopathological studies of rats fed ginger lily corm meal as shown below.

### DETERMINATION OF ALKALINE PHOSPHATASE ACTIVITY

The activity of Alkaline phosphatase was determined using Bodansky (1932) method.

**DETERMINATION OF ASPARTATE AND ALANINE AMINOTRANSFERASE (AST AND ALT) ACTIVITIES IN SERUM**

The activities of AST and ALT were determined using Reitman and Frankel (1957) method.

**TOTAL PROTEIN DETERMINATION**

The total protein was determined using the QCA test kit according to (Wiechselbum, 1946) method.

**STATISTICAL ANALYSIS**

The data reported in the experiment were analysed by one way ANOVA (LSD) using SPSS Version 16.0. The mean were reported with standard deviation. Significant difference was accepted at (p<0.05) level of probability.

**RESULTS**

**LIVER FUNCTION MARKER MARKER AST**

**Aspartate Aminotransferase (AST)**

The results of the serum Aspartate aminotransferase level of rats fed with diet containing Ginger lily corn is presented in fig. 1. The results indicate that the concentration of AST of 5, 10 and 20%, significantly decreased (p<0.05) when compared with the control.

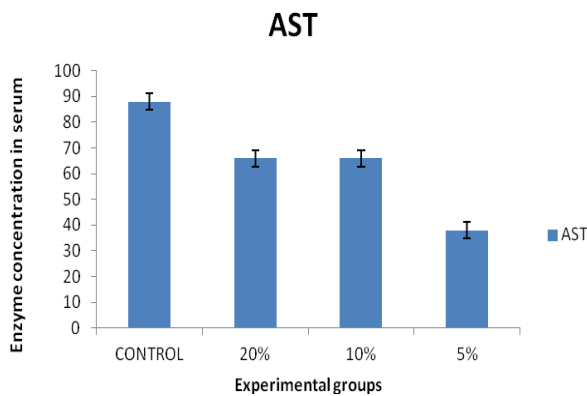


Fig. 1: Serum AST level of rats fed with Ginger lily corn.

**Alanine Aminotransferase (ALT)**

The results of the serum Alanine aminotransferase level of rats fed with diet containing Ginger lily corn is represented in fig. 2. The result indicates that the concentration of ALT in serum of 10% Ginger lily group was significantly increased (p<0.05) when compared with the control, and there was no significant difference (p>0.05) when 20% ginger lily group was compared with the control. The ALT, 5% ginger lily group decreased significantly (p<0.05) when compared with the control.

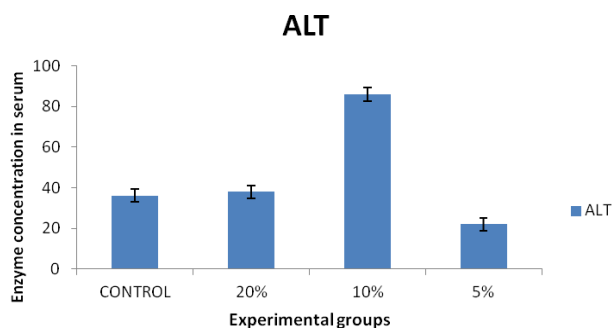


Fig.2: Serum ALT level of rats fed with Ginger lily corn.

**ALKALINE PHOSPHATASE (ALP)**

The result of serum Alkaline phosphatase level of rats fed with diet containing Ginger lily corn is represented in fig.3. This result indicates that the ALP activity of 20% non-significantly increased (p>0.05) when compared with the control while the ALP concentration of 10% and 5% significantly increased (p<0.05) when compared with the control.

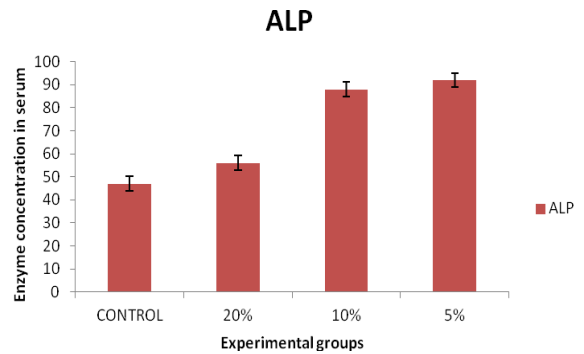


Fig.3: Serum ALP level of rats fed with Ginger lily corn.

**TOTAL PROTEIN**

The result of serum total protein concentrations of the rats fed with diet containing Ginger lily corn is represented in fig.4. The result showed a non-significant increase (p>0.05) in Total Protein of 20%, 10% and 5% groups when compared with that of the control.

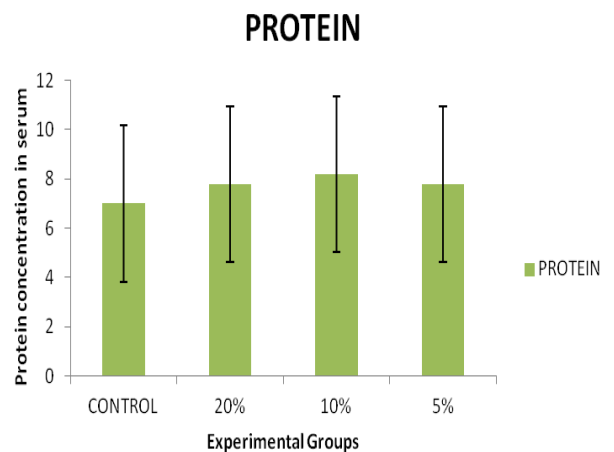


Fig.4: Serum Protein level of rats fed with Ginger lily corn.

**PHOTOMICROGRAPH IMAGE OF THE LIVER**

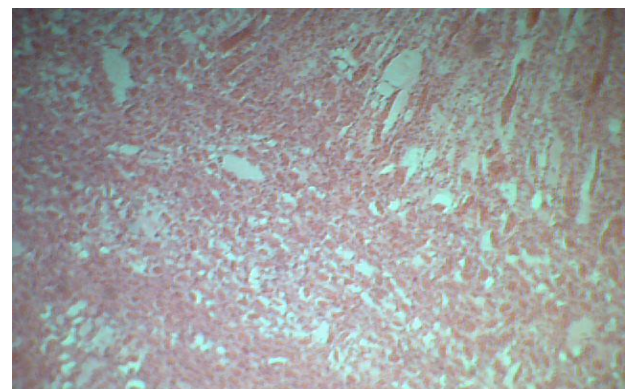


Plate 1: Mag 10x10, Liver cells of control group.

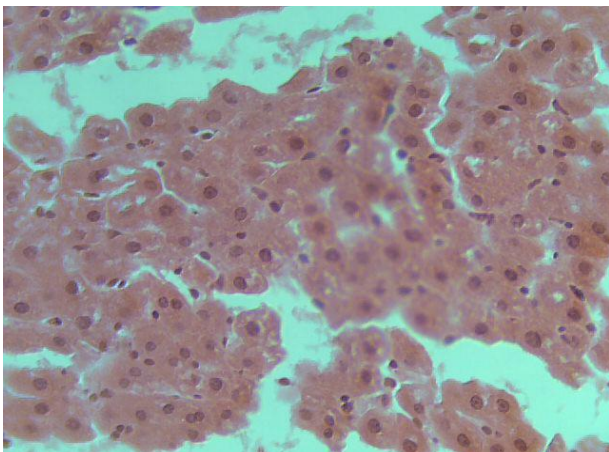


Plate 2: Mag 40x40, Liver cells of 20% fed Ginger lily.

## DISCUSSION

Serum enzymes serve as marker or fairly specific indicator of the liver status. Commonly high level of liver enzymes in the serum is an indication of damage to liver cells (extensive hepatic necrosis) and even liver cell death (Kasper *et al.*, 2005). However, they are not always good indications of how well the liver is functioning as elevation of these enzymes are often unexpectedly encountered on routine blood screening test in otherwise healthy individuals (McPherson, 2007). Alanine aminotransferase (ALT) is an enzyme present in hepatocytes (liver cells). When a cell is damaged, the enzyme leaks into the blood, where it accumulates. ALT rises dramatically in acute liver damage. Elevations are often measured in multiples of the upper limit of normal (9 to 60µg/L) (Nyblom *et al.*, 2006). Elevation of liver enzymes may be primarily due to liver damage or loss of integrity or the abnormal results can be secondary to other problems elsewhere in the body (Giannini *et al.*, 2005). Alternatively, there may be nothing wrong with the liver at all. Traditionally, 'normal' values are defined as being within  $\pm 2$  standard deviation meaning that 2.5% of a healthy population will have results outside the normal range.

The ALT level of the rats group with the ginger lily corm (5 and 10%) increased significantly ( $p < 0.05$ ), which signifies acute liver damage. ALT levels are usually not as high in chronic hepatitis, often less than 4 times the highest normal level (Giboney, 2005). This effect is shown in 20% ginger lily corm group (fig.2).

The AST level of the rats group with the ginger lily corm (5 and 10%) significantly decreased ( $p < 0.05$ ) when compared with the control group, which signifies that Ginger Lily had no liver damage effect on AST. AST levels are usually not as high in chronic liver injury, often less than 4 times the highest normal level (Giboney, 2005). This effect is seen in 20% ginger lily corm group (fig.1).

High ALP usually means that either the liver has been damaged or a condition causing increased bone cell activity is present as seen in rats groups fed with 5 and 10% ginger lily corm (Pagana, 2006). ALP levels are usually not as high in chronic liver damage, often less than 4 times the highest normal level (Giboney, 2005). This effect is seen in rats' group 20% ginger lily corm (fig.3).

Proteins are important building blocks of all cells and tissues; they are important for body growth, development, and health. They form the structural part of most organs and make up enzymes and hormones that regulate body functions (Pagana *et al.*, 2006). A low protein level may reflect overproduction of globulins, such as seen in multiple myeloma or autoimmune diseases, or underproduction of albumin, such as occurs with cirrhosis, or selective loss of albumin from the circulation (Burtis, *et al.*, 2006), as seen in rats groups 5 and 20%. A high protein level suggests underproduction of immunoglobulins as may be seen in some

genetic deficiencies and in leukemia's (Burtis, *et al.*, 2006), as seen in rats group 10%.

In this study, histopathological sections of the liver, of *G. unguiculata* corm meal-fed rats showed some hepatotoxic effects which might be responsible for the hepatocytic necrosis and mononuclear leucocytes infiltration of the periportal areas of the test rats when compared with those of the control rats as illustrated in Plates 1 and 2.

## CONCLUSION

In conclusion, the *G. unguiculata* fed diets damaged the liver and also increased the Total protein. Further analysis should be done in order to ascertain the biochemical reasons behind this liver impairment.

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