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Histo-pathological alterations of the stomach of guinea pigs following administration of root Aqueous extract of Telfairia Occidentalis

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ABSTRACT

The root of Telfairia occidentalis is said to contain potent poison which could cause cell death, despite the usefulness of the leaves, stem, fruits and seeds of this plant. The study investigated the effects of the aqueous root extract of Telfairia occidentalis on histology of the stomach and blood serum urea and creatinine level. A total of 15 Guinea pigs were randomly selected into Three (3) groups A, B and C which were treated with 1ml of distilled water, 100 mg/kg of Telfairia occidentalis and 200 mg/kg of Telfairia occidentalis for period of six (6) weeks of experiment respectively. Animals were sacrificed by cervical dislocation after the last administration, Stomach was excised and fixed in 10% formosaline following abdominal incision and Blood sample was collected for Serum creatinine concentrations and Serum urea examination. Results obtained revealed insignificant changes in the serum level of urea and creatinine but histological alteration in the mucosa lining of stomach caused by irritation was observed in the treated animals when compared with the control. The root aqueous extract of the Telfairia occidentalis demonstrated a potent detrimental action on the mucosa lining of the stomach.

Keywords : Stomach, Blood Urea, Blood Creatinine Guinea pigs, Telfairia occidentalis

INTRODUCTION

Telfairia occidentalis, Hook, F. (Cucurbitaceae) popularly known as fluted pumpkin is cultivated in the Southern part of Nigeria (1). Both leaves and seeds of the plant are consumed because of their high content of protein, vitamins and minerals (2). Ethnobotanically, the leaves of *Telfairia occidentalis* are useful in the treatment of convulsion, anaemia, atherosclerotic cardiovascular disease, hypertension, malaria and impotence (3, 4, 5, and 6). The leaf extract is useful in the management of cholesterolemia, liver problems and impaired defense immune systems (7). The hypoglycaemic and antidiabetic activities of the leaf have been reported (8, 9, and 10). The antioxidant and antimicrobial activity of the leaf have also been reported by Oboh *et al*. 2006 (11). There is a general belief that the roots are highly poisonous. The root is reported to contain alkaloids, saponins, glycosides and triterpenes (12; 6). Antibacterial activity of the root extract against *Staphylococcus aureus*, *Streptococcus pyogenes*, *Shiegella dysenterae* and *Kliebsiella*

pneumoniae has been reported by Odoemena and Essien (1995). In spite of the usefulness of the leaves, stem, fruits and seeds of this plant, the root is said to contain potent poison which could cause death. Herbal toxicity has been reported on some of the Chinese herbs used for curing of different ailment. One of the most serious recent occurrences of toxicity involving Chinese herbs came to light between 1991 and 1992 in Belgium, where a series of young women were admitted to hospitals suffering from renal failure.The root extract of *Telfairia occidentalis* (Fluted Pumpkin) was found to contain resin, alkaloids and saponin which are lethal to rats and mice (12). Fluted pumpkin roots had very high levels of antinutrients which include oxalate (2600 mg/100 gDM), cyanides (84.2 mg/100 gDM), tannins (60.1 mg/100 gDM) and phytates (84.4 mg/100 gDM) and may constitute potent human poisons (13). This study is designed to test the toxicity of the aqueous extract of the root of Telfairia occidentalis on some organ and some biochemical parameters in guinea pigs.

MATERIALS AND METHOD

Animals and Formation of Treatment Groups

Ten 15 guinea pigs (weighing 350–351 g) were used for this study. The animals were kept in the Animal house of the Department of Anatomy, Ladoke Akintola University of Technology and were maintained under standard laboratory conditions of temperature (25 ± 4 ^{o}C); light (approximately 12-12 hour's light-dark cycle) and humidity (70 ± 5%). They were allowed free access to normal Animal chow and to clean water. The Animals were randomly divided into Three (3) groups: A, B and C. Group A served as the control. Groups B was daily administered 100 mg/kg body weight of the aqueous root extract of Telfairia occidentalis and Groups C was daily administered 200 mg/kg body weight of the aqueous root extract of Telfairia occidentalis respectively. All the treatments were for six weeks.

Extract preparation;

The root of Telfairia occidentalis was obtained from Ibadan, authenticated at the Department of Botany, Ladoke Akintola University, Ogbomosho. The identified root was air dried at room temperature and grinded using an electric blending machine into powdered form, dissolved in distilled water for 24 hours and then filtered. The filtrate was concentrated using a water bath maintained at 70 °c, the concentrate was dissolved in phosphate buffered saline for dosage preparation and media for administration and preserved in refrigeration throughout the experimental period.

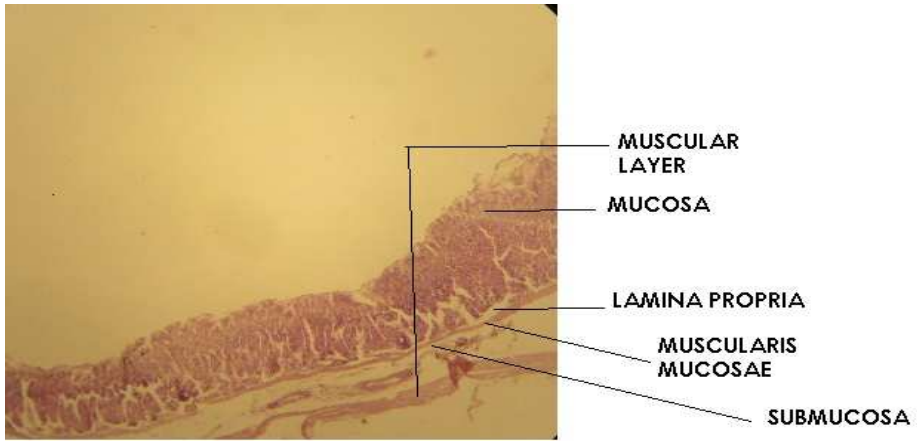
Extract Administration; The administration of the extract was totally by gavages, proper concentrations were administered by the use of metal oropharyngeal canula. The administration of Telfairia occidentalis root extract was done once daily at 0700 hour for period of Six (6) weeks. 10 Guinea Pig were divided into three groups (A, B and C) of 5 animals each. Group A served as control and was given 1ml of distilled water daily for Six weeks, Group B was given 100 mg/kg body weight of aqueous root extract of Telfairia occidentale, Group C was given 200 mg/kg body weight of aqueous root extract of Telfairia occidentale daily for Six weeks.

Animal Sacrifice, Collection of Samples and Data, and Statistical Analysis

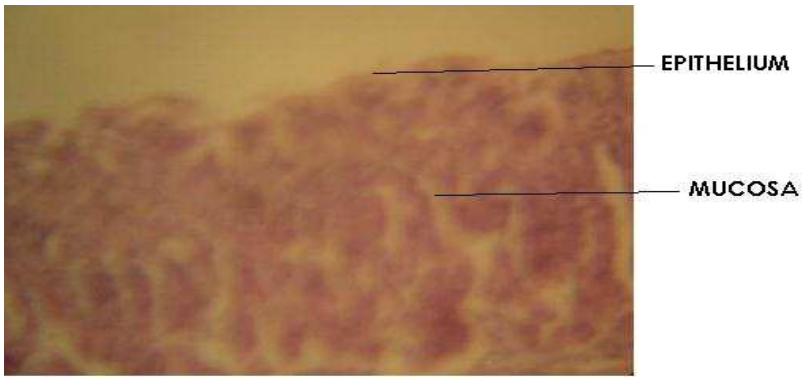
Animals were sacrificed by cervical dislocation and blood samples were collected, serum creatinine concentrations were determined using alkaline picrate method described by Jaffe. Serum urea was determined according to the method described by Guyton and Hall 2001. Stomach was removed and fixed in 10 % formosaline for histological observation following abdominal incision. Independent samples t-test was used to test for significant difference between treated group and the

control.

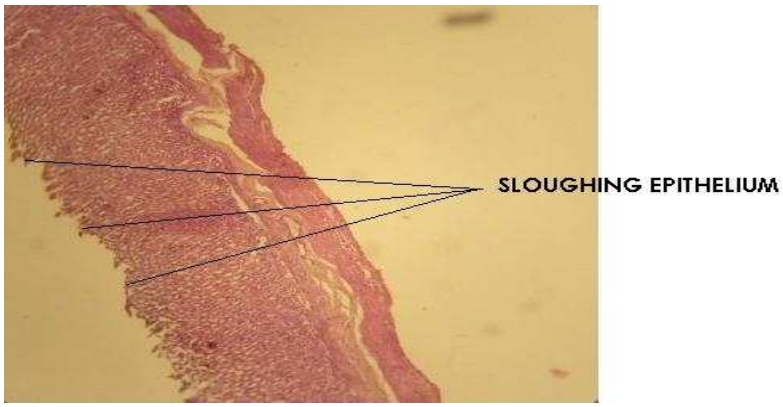
RESULT AND DISCUSSION



Slate 1a: Photomicrograph of the Stomach of control group (x100) H&E stain. The slate revealed layers of stomach section. The gastric mucosa shows no irregularities. The lamina propria is also well aligned. The submucosa and muscular layer also show no lesions or irregularities. The slate expressed normal histology of the stomach

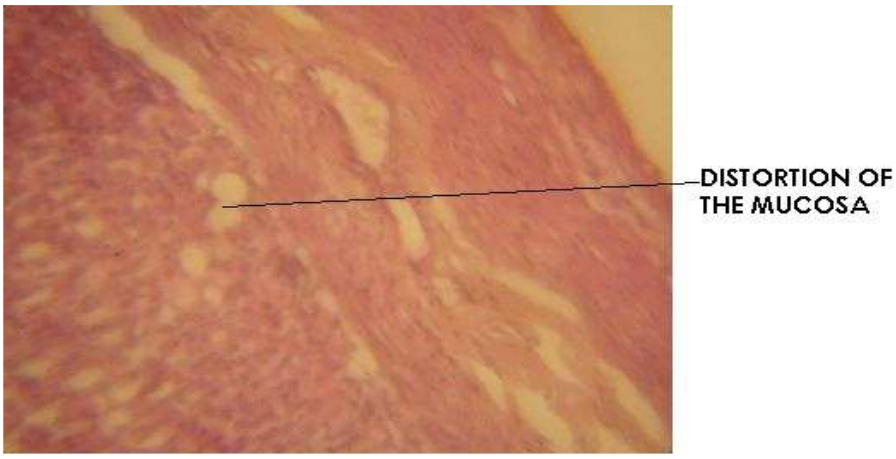


Slate 1b: Photomicrograph of the Stomach of the control group, H&E stain (x400). This shows the mucosa at a higher magnification (x400) as well as the epithelium. The mucosa shows no space occupying lesion and the cytoarchitecture is also normal. The epithelium show no scalloping or outgrowths which are in keeping with a normal gastric epithelium and mucosa limits.

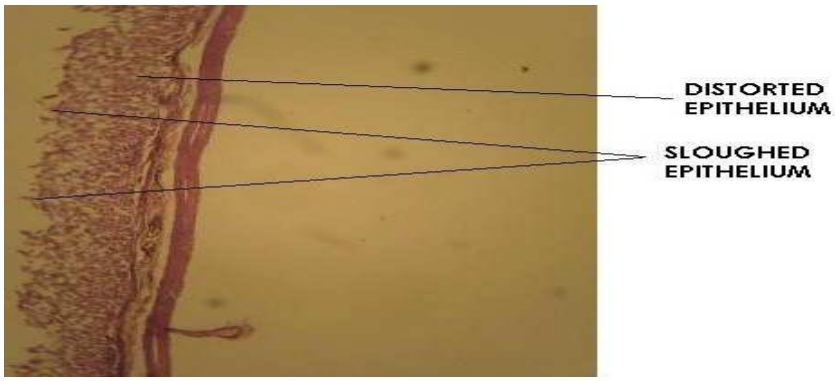


Slate 2a: Photomicrograph of the Stomach of the low dose H&E stain (x100). Scalloping of the epithelium was noticed which could be due to sloughing of the epithelium. The mucosa also shows

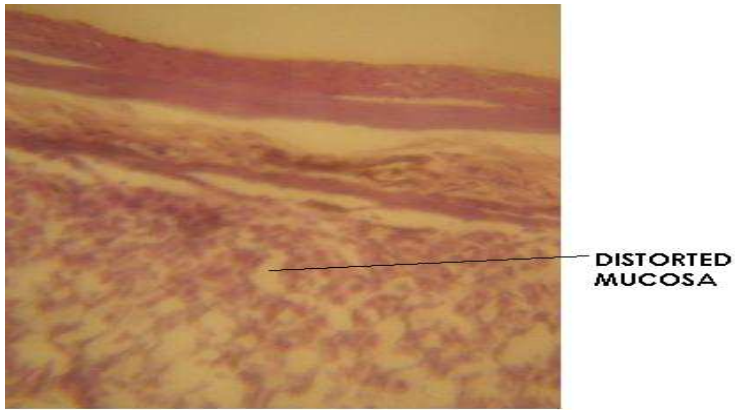
numerous lesions within it. Expressing distortion of the mucosa and sloughing of the epithelium which might be due to irritation of the mucosa.



Slate 2b: Photomicrograph of the Stomach of the low dose H&E stain (x400). This is the mucosa at a higher magnification which shows several lesions within the mucosa causing distortion of the mucosa lining.



Slate 3a: Photomicrograph of the Stomach of the high dose H&E stain (x100). This shows more lesions in the mucosa than the previous two slides (slate 2a&b) which indicates a later stage of infection or disease and the epithelium also appear to be more scalloped than the previous slides. This revealed gastric infection or irritation caused by the administration of the extract.



Slate 3a: Photomicrograph of the Stomach of the high dose H&E stain, a higher magnification (x400) of the mucosa showing large lesions and layering of the lamina propria which are in keeping with an acute gastric irritation or infection.

Table 1; Shows the effect of Telfairia occidentalis aqueous root extract on blood urea and creatinine level

	Blood Urea Concentration (mg/100ml)	Blood Creatinine concentration (mg/100ml)
CONTROL	4.5±0.4531	0.5±0.8378
LOW DOSE	5.0±0.4531	0.55±0.8378
HIGH DOSE	6.1±0.4531	0.7±0.8378

Results are presented as mean ± standard error of mean; "$p < 0.05$"

The study was carried out to know some effect of aqueous root extract of *Telfairia occidentale* on the histology of the stomach and the blood urea and creatinine levels. Group A served as control. They were given distilled water *ad libitum* daily. The histology of the stomach revealed normal epithelium, the submucosa, lamina propria and muscular layers are all intact keeping with the normal histology of the stomach. The group B animals were given root extract of Telfairia occidentale at 100 mg/kg for Six weeks. The histology showed sloughing of the epithelium. The lamina propria and submucosa appears within normal limit. This alteration in the normal architecture of the stomach might have resulted from irritation of the stomach caused by the presence of Tannins in the extract. Tannins are present in root extract of Telfairia occidentale (13). Tannin is said to cause irritation of the stomach and gastrointestinal tract in general according to work done by Ekpedeme et al, 2000. The group C animals were given root extract of Telfairia occidentale at 200 mg/kg for Six weeks; the photomicrography showed sloughed epithelium and distorted mucosa which might be due to presence of Tannin in the extract (13). The extent of alteration in the histological arrangement was observed to be more pronounced in the group that was treated with the high dose.

The blood urea and creatinine level shows no significance changes in the treated animals when compared with the control animals. This result indicates that the root extract has no significant effect on the blood urea level as well as the creatinine level. When applied internally, tannins affect the walls of the stomach and other digestive parts. They sour the mucus secretions and contract or squeeze the membranes in such a manner that secretions from the cells are restricted. The good thing is that tannins' anti-inflammatory effect helps to control or curb all indications of gastritis, enteritis, oesophagitis and irritating bowel disorders (14). This action is possible by involving lymph stasis and neutralizing the autolytic enzymes. Conventionally, tannins have also been used to cure diarrhea. In most rural areas diarrhea is caused due to the irritation of the enteritis or the small intestine and is the reason for many deaths worldwide (15). The affinity of divalent metal ions is sometimes reflected in their tendency to form insoluble precipitates. Thus in the body, oxalic acid also combines with metals ions such as Ca^{2+}, Fe^{2+}, and Mg^{2+} to deposit crystals of the corresponding oxalates, which irritate the gut and kidneys. Fluted pumpkin roots had very high levels of antinutrients which include oxalate (2600 mg/100 gDM), cyanides (84.2 mg/100 gDM), tannins (60.1 mg/100 gDM) and phytates (84.4 mg/100 gDM) and may constitute potent human poisons (13). The root and/or leaves of rhubarb and buckwheat are listed as being high in oxalic acid (16). It arises biosynthetically via the incomplete oxidation of carbohydrates. Other edible

plants that contain significant concentrations of oxalate include—in decreasing order—star fruit (carambola), black pepper, parsley, poppy seed, amaranth, spinach, chard, beets, cocoa, chocolate, most nuts, most berries, New Zealand Spinach (*Tetragonia tetragonioides*) and beans (17). Long-term consumption of foods high in oxalic acid can be problematic, because it binds with vital nutrients such as calcium. Healthy individuals can safely consume such foods in moderation, but those with kidney disorders, gout, rheumatoid arthritis, or certain forms of chronic vulvar pain (vulvodynia) are typically advised to avoid foods high in oxalic acid or oxalates. The calcium oxalate crystals or precipitate (better known as kidney stones) obstruct the kidney tubules. An estimated 80% of kidney stones are formed from calcium oxalate (18). Conversely, calcium supplements taken along with foods high in oxalic acid can cause calcium oxalate to precipitate out in the gut and drastically reduce the levels of oxalate absorbed by the body (by 97% in some cases) (19).

Conversely, Telfairia occidentalis and extracts (such as aqueous and ethanol extracts) from the leaves have been found to suppress or prevent the production of free radical and scavenge already produced free radical, lower lipid peroxidation status and elevates antioxidant enzymes (such as superoxide dismutase and Catalase) both in vitro and in vivo (20,11, 21, 22; 23,24, 25). Telfairia occidentalis has also be found to protects and ameliorates oxidative brain and liver damaged induced by malnutrition in rats (24, 25). Nwanna and Oboh (2007) reported the hepatoprotective property of polyphenol extracts of Telfairia occidentalis leaves on acetaminophen induced liver damaged Oboh 2005 (26) reported that both aqueous and ethanolic extracts of T. occidentalis leaves protect the liver cells against garlic- induced oxidative damage. However, the aqueous extract is more effective than the ethanolic extracts, which could be attributed to the higher antioxidant activity of the aqueous extracts of T. occidentalis leaves.

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