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The Anti-Ulcer Effect of Scent Leaf (*Occimum Gratissimum*) on the Stomach and Duodenal Lining of Ethanol- Induced Gastric Ulcer in Wistar Rats.

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ABSTRACT

Plants make an important contribution to health care. This is due to the recognition of the value of traditional medicinal systems. *Occimum gratissimum* (O. *gratissimum*) is used in the coastal areas of Nigeria for the treatment of various ailments. This study was done to investigate the morphological effects of the aqueous leaf extract of O. *gratissimum* on the stomach and duodenal lining of ethanol induced gastric ulcer in adult Wistar rats as well as its effect on their weight. Twenty four (24) adult Wistar rats of average weight 255g grouped into four (4) with six (6) rats per group were used for this study. Group A was the normal control, group B was the test control, group C and D were administered with 1ml absolute ethanol to induce ulcer. Group C and D were then administered with 2.5mg/kg body weight per day of aqueous leaf extract of O. *gratissimum* through oral route for seven (7) and fourteen (14) days respectively. After each treatment period the rats were sacrificed and the stomach and duodenum excised and fixed in 10% formal saline. Thereafter, slides of histological sections were prepared. It was observed that aqueous leaf extract of O. *gratissimum* considerably reduced the degree of ulceration on both the stomach and duodenum and the findings were duration dependent. It also improved the weights of the animals.

Key words; *occimum gratissimum*, Gastric ulcer, Wistar rats

INTRODUCTION

Ocimum gratissimum (O. *gratissimum)* is a small shrub commonly known as "scent leaf," "fever plant". In Nigeria, it is variously called "Nchuanwu," "Ahinji," "Ahigbu" (Igbo), "Efirin" (Yoruba), "Ihirieziza" (Bini), "Dai doyatagida" (Hausa) or "Ntion" (Efik) and is found in the wild or cultivated throughout the tropics and subtropics [1]. In traditional medicine practice, it is used in the treatment of diarrhea, as a febrifuge and component of anti-malaria remedies, mosquito/insect repellant, stomachic and general tonic, antiseptic, in wound dressing, skin infections, conjunctivitis and bronchitis [2]. An infusion of the leaves, called '*Ocimum* tea,' is dispensed as a remedy for fever and diaphoresis [1]. The roots are used as sedative for children [3]. Extract of the crushed leaves is an excellent remedy for cough. In southeastern parts of Nigeria, in addition to serving culinary purposes, the leaves are also used for the treatment of convulsive disorders [4].

Experimental studies showed that extracts of this plant relaxed intestinal smooth muscle, exhibited antinociceptive effect, contracted the guinea pig ileum and rat colon, raised mean arterial pressure in rats and lowered blood glucose in diabetic rats [5].

A study on rats also found evidence that a leaf extract of the plant prevented diarrhea [6]. In 2004, researchers carried out an in vitro study on the ileum of guinea pig. Results showed that O. *gratissimum* extract mimicked the action of adrenaline and nor adrenaline on the isolated guinea pig ileum by abolishing the acetylcholine-induced contraction of the smooth muscle of the ileum [7].

This study is aimed at determining the effects of aqueous extract of O. *gratissimum* leaves on the stomach and duodenal mucosal lining of adult Wistar rats when administered as anti-ulcer agent.

MATERIALS AND METHODS

Plant material

The leaves of O. *gratissimum* were collected from Uselu market in Egor local government area of Edo State and identified by Mr. Joseph Irhabor, a botanist in the department of Plant and Biotechnology, University of Benin.

The plant sample collected was air dried for 3days, oven dried at 40 degrees celsius. It was grinded with a miller to get the final powder sample. The powdered sample had a weight of 720g and was soaked in a chromatographic tank for 24hrs in 1.3litres of distilled water. This was followed by filtration into a conical

flask. The filtrate was concentrated in a water bath using an evaporating dish to produce a gel like extract. Appropriate concentration of the extract was then subsequently made by dilution with distilled water. The extracts were put in an air tight container and refrigerated at 4 degrees celsius until required for use.

Experimental animals

Twenty-four male Wistar rats were obtained from the Department of Anatomy, Faculty of Basic Medical Sciences, University of Benin, Ugbowo Campus and were used for this research. The rats were randomly divided into four groups (A, B, C and D) with each group consisting six Wistar rats. Groups A and B were the control (A was the normal control and B was the test control), while group C and D were the treatment groups. The mean weight of the rats was 255g.

After two weeks of acclimatization, three groups of rats were injected intraperitoneally with 1ml/kg bodyweight of absolute ethanol to induce ulcer [8]. Ulcer induced rats were considered for the evaluation of erosions in the mucosal lining of the stomach and duodenum.

The normal control group was not administered with ethanol. The rats in groups A, B and C were allowed to fast for 24hrs, before administration of ethanol. This is because unfed rats are more susceptible to ethanol-induced gastric damage.

Experimental Group A: This was the normal control group that received only feed and water throughout the experiment period.

Experimental Group B: This was the test control group that was induced with ulcer and was sacrificed to confirm ulcer was induction.

Experimental Group C: This group was administered with safe dose of aqueous extract of O. *gratissimum* of 2.5mg/kg body weight per day .The animals were sacrificed after seven (7) days.

Experimental Group D: This group was administered a dose of 2.5mg/kg body weight per day of aqueous extract of O. *gratissimum*. The animals were sacrificed after fourteen (14) days.

All extract administration was done by the oro-gastric route.

The rats were sacrificed and the stomach and duodenum were harvested for histological examination.

RESULTS

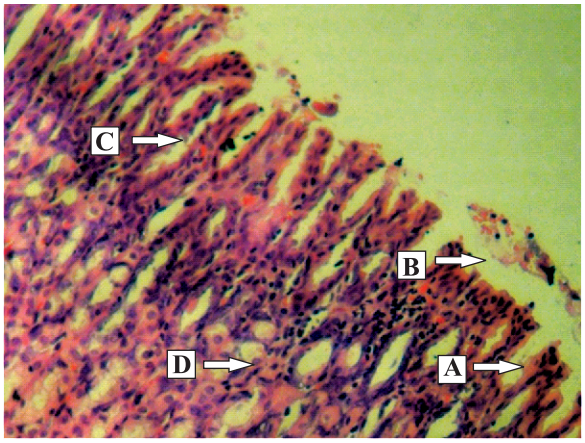

Plate 1a: Control Rat Gastric mucosa composed of epithelial lining A, pit B, lamina propria C and glands D (H&E x 10)

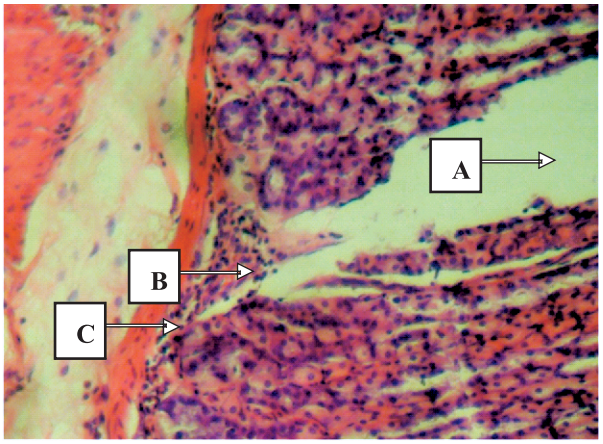

Plate 2a: Test Control; Transverse section of Rat Stomach induced with ulcer showing funnel shaped mucosal exfoliation A, mild vascular congestion B and mild infiltrates of inflammatory cells C (H&E x 10). It shows a breach in the epitheluim that reaches the muscularis mucosa

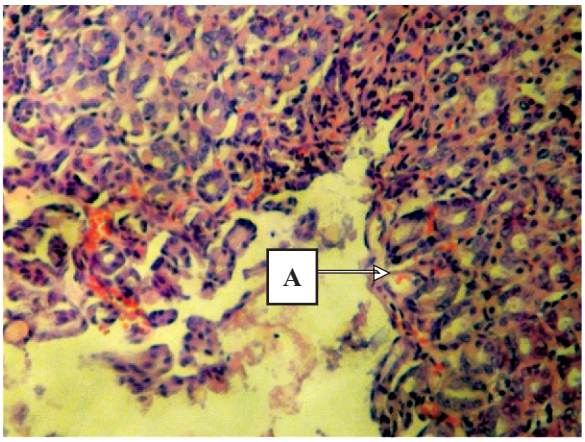

Plate 3a: Transverse section of Rat Stomach treated with 2.5ml O. *gratissimum* extract for 7 days showing superficial mucosa exfoliation A (H&E x 10). It indicates a milder degree of mucosa breach.

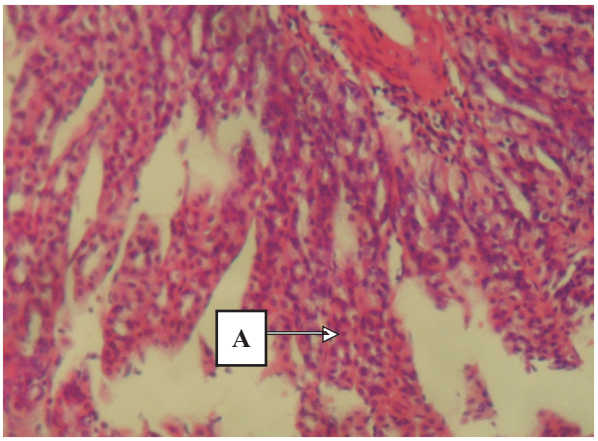

Plate 4a: Transverse section of Rat Stomach treated with O. *gratissimum* for 14 days showing mild superficial mucosa exfoliation A (H&E x 10)

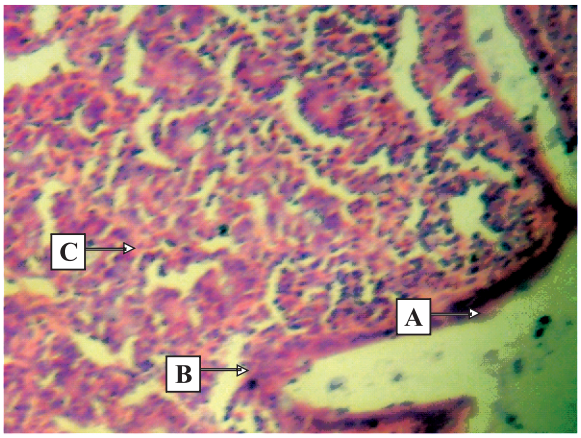

Plate 1b: Control: Transverse section of normal duodenal mucosa composed of epithelial lining A, lamina propria B and glands C (H&E x 10)

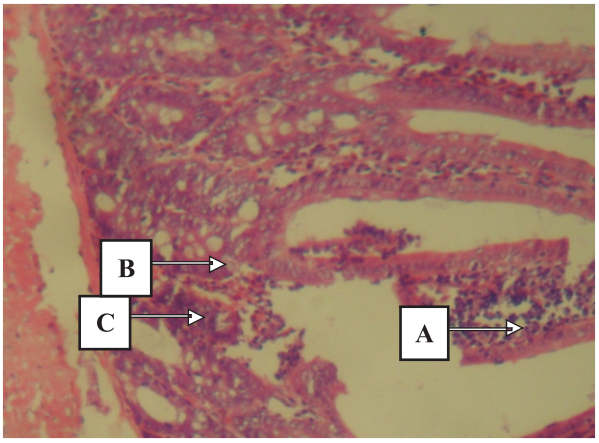

Plate 2b: Test Control; Transverse section of Rat duodenum induced with ulcer showing irregularly shaped mucosal exfoliation A, mild vascular congestion B and mild infiltrates of inflammatory cells C (H&E x 10)

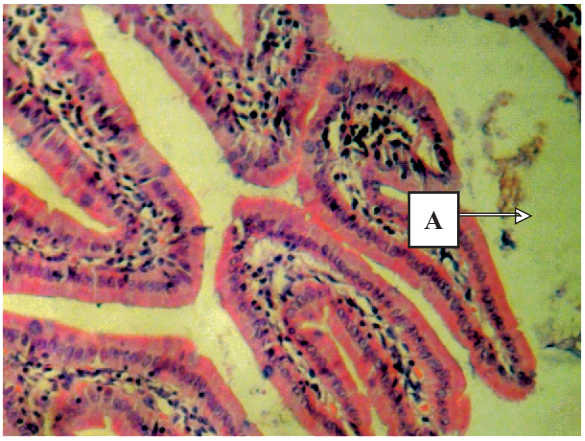

Plate 3b: Transverse section of Rat duodenum treated with 2.5ml O. *gratissimum* extract for 7 days showing fairly unremarkable mucosa A (H&E x 10)

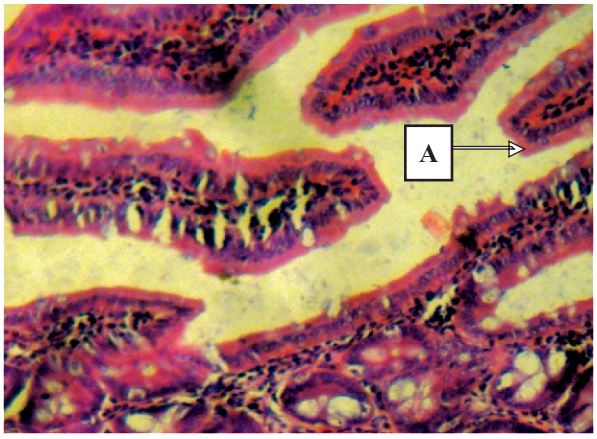

Plate 4b: Transverse section of rat duodenum treated with O. *gratissimum* for 14 days showing fairly unremarkable mucosa A (H&E x 10)

Table 1: Mean Weight Changes in the Rats

Animal Group	Days of administration	Mean weight before extract administration(a)	Mean weight at the end of administration (b)	Mean weight difference (b-a)	Mean weight change (%)
A	14days	247±5.4	260±2.9	13±2.5	+5.26
B	_	206±3.7			
C	7days	255±6.2	201±4.6	54±1.6	-21.17
D	14days	240±3.1	231±5.4	2±2.3	-3.75

Significantly different from the value of control Mean ± S.D ($P<0.005$; all weights in grams)

DISCUSSION

The results showed that there was a general disruption of the mucosal lining of the stomach and duodenum coupled with infiltration of inflammatory cells and mucosal ulceration extending into the muscularis mucosae of the test control (plate 2a & 2b). This confirms the exertion that intra-peritoneal injection of 1ml//kg bodyweight of absolute ethanol induces ulcer in fasted rats [8]. After the seventh and fourteenth day of administration of O. *gratissimum* extract, it was observed that the degree of ulceration had decreased relative to the duration of administration of the extract (plates 3a, 3b, 4a, & 4b)

The weight of the group C animals treated with 2.5ml of O. *gratissimum* for seven days showed a greater reduction in weight (-21.17%) when compared to the control rats with a weight increase (+5.26%). The change was a statistically significant ($P<0.05$). This confirms previous work that gastric ulcer results in loss of body weight [9].

Also the reduction in the weight loss (3.75%) of animals in group D which received treatment for fourteen (14) days is lesser than that of animals in group C (21.17%) which received treatment for only seven (7) days.

CONCLUSION

Administration of aqueous extract of O. *gratissimum* has an ulcer healing potential in Wistar rats with resultant weight improvement, which is duration dependant.

REFERENCES

1. Iwu MM. Handbook of African medicinal plants. Florida: CRC Press Inc. Boca Raton; 1993; Pp 214-215
2. Oliver B. Medicinal plants in Nigeria. Ibadan, Nigeria: Nigerian College of Arts, Science and Technology; 1960.
3. Di Stasi LC, Oliveira GP, Carvalhaes MA, Queiroz M, Jr, Tien OS, Kakinami SH. Medicinal Plants Popularly used in the Brazilian Tropical Atlantic Forest. Fitoterapia, 2002; 73: 69–91.
4. Dalziel JM. Useful plants of West tropical Africa London: Crown Agents for Overseas Governments: 1956.
5. Mohammed A., Tanko Y., Okasha M.A., Magaji R.A., Yaro A.H. Effects of aqueous leaves extract of Ocimum gratissimum on blood glucose levels of streptozocin-induced diabetic wistar rats: African Journal of Biotechnology, 2007; 6:18 (2087-2090)
6. Surana V., Jain D. Protective effect of ocimum gratissimum against carbon tetrachloride induced hepatic damage in rats: Pharmacologyonline, 2010; 2: 1111-1119
7. Esvanszhuga G. The chemical constituent of Ocimum gratissimum: Doki Tskha, 1980; 244 (2). 72-77.
8. Salawu O. A., Tijani A.Y., Obidike I. C., Martins E. and Rafindadi A. H. Anti ulcerogenic Properties of Methanolic Root Extract of Pilostigma Reticulatum in Rats African Journal Pharm Pharmacol. 2009; 3(5): 252-258.
9. Pino J. A., Rosada A., Fuestes V. Composition of the essential oils from the leaves and flowers of Ocimum gratissimum L. grown in Cuba: Journal of essential oil of research, 1996; 8: 139-141.
10. Ekunwe S.I., Thomas M.S., Luo X., Wang H., Chen Y., Zhang X., Begonia G.B. Potential Cancer-fighting Ocimum gratissimum (OG) Leaf Extracts: Increased Anti-proliferation Activity of Partially Purified Fractions and Their Spectral Fingerprints: Ethnicity & Disease, 2010; 20:1 Suppl 1 (12-6)
11. Sonnenberg; Müller-Lissner SA, Vogel E, Schmid P, Gonvers JJ, Peter P, Strohmeyer G, Blum AL: Predictors of duodenal ulcer healing and relapse: Journal of Gastroenterology, 1981; 81 (6): 1061–7.