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PROPHYLACTIC POTENCY OF *RICINODENDRON HEUDELOTII* SEEDS AGAINST ASPIRIN-INDUCED ULCER

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ABSTRACT: This study evaluated the prophylactic potency of ethanol seed extract of *Ricinodendron heudelotii* against aspirin- induced gastric mucosal injury in albino rats. Gastric ulcer was induced by administering 200mg/kg body weight 24 hourly of Aspirin for three successive days to the experimental animals in group 2-5, group 1 served as control. The animals were grouped into five in the order: group 1: Control, group 2: Reference Treatment (200mg/kg/bw omeprazole), group 3: Treatment 1(50mg/kg/bw ethanol extract *Ricinodendron heudelotii* seed,), group 4: Treatment 2(100mg/kg/bw ethanol extract *Ricinodendron heudelotii* seed), group 5: Treatment 3(150mg/kg/bw ethanol extract *Ricinodendron heudelotii* seed). Data obtained after experimental procedures showed a significant increase in pH of the gastric juice, volume of gastric juice at $P \leq 0.05$, absence of *Helicobacter pylori* and a positive fecal occult blood test than those in the control group. Treatment of the rats with 200mg/kg/bw Omeprazole, 50mg/kg/bw, 100mg/kg/bw and 150mg/kg/bw of ethanol seed extract of *Ricinodendron heudelotii* for groups 2, 3 4 and 5 respectively, revealed the prophylaxis of the pH and volume of the gastric juice, a negative test result for fecal occult blood and absence of *Helicobacter pylori* in all treated groups, when compared with the control group (group 1) after 21 days of treatment. This suggests the potency of the ethanol seed extract of *Ricinodendron heudelotii* to enhance prophylaxis of gastric mucosal injury.

KEYWORDS: Aspirin, *Ricinodendron heudelotii,* Gastric ulcer, Omeprazole.

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1. INTRODUCTION

Aspirin, also referred to as Acetylsalicyclic acid is a non-steroidal anti-inflammatory drug used in acute or chronic pain reduction, and in decreasing fever. In high doses, it decreases inflammation. Its associated side effects includes an increased risk of stomach ulcers, gastrointestinal problems, and heart attacks [15] which poses a cause for concern. The Gastric mucosal layers serves as a barrier that limits the exposure of the gastric mucosal cells to numerous injurious luminal agents and irritants of exogenous and endogenous origin, [20]. The mucosal surface epithelium is prone to attack by physical, chemical or microbiological agents acting from the gastric lumen, which are involved in multiple pathologies, such as gastritis, peptic ulcer or gastric ulcer [20]. Gastric ulcers occurs along the lesser curvature of the stomach and varies from millimeters to centimeters in size, caused commonly by the bacteria *Helicobacter pylori* and non-steroidal anti-inflammatory drugs (NSAIDs) [12]. However, in his experiment [16], reported that mismanagement of gastric ulcers, which is becoming epidemic, could lead to death. Aspirin which is a known NSAIDs is associated with side effects including damage to the gastrointestinal mucosa by irritant action, alterations in mucosal permeability and suppression of prostaglandin synthesis [9]. Other factors such as gastric acid and pepsin secretion, gastric microcirculation, pro-inflammatory cytokines interleukin (IL-1) and tumor necrosis factor (TNF-α) also play important roles in the damage of the gastric mucosa, and the subsequent development of ulcers [19]. Since secretion of gastric acid is still recognized as a central component of gastric ulcer, in their experiment, [14] therefore, reported that the main therapeutic target in treatment of gastric ulcer is the control of this secretion using acid blockers such as ranitidine. Omeprazole is a selective and irreversible proton pump inhibitor that suppresses stomach acid secretion by specific inhibition of the H^+/K^+- ATpase system found at the secretory surface of gastric parental cells. This enzyme system is regarded as the acid (proton, or H^+) pump within the gastric mucosa, as a result, omeprazole inhibits the final step of acid production. Despite the availability of over the counter drugs for oral administration or by prescription for parenteral administration for treatment of gastric ulcers, hypersecretory diseases and gastroesophageal reflux disease, report by [5] stated that it is faced with a major drawback because most of the drugs currently available in the market show limited efficacy against gastric diseases and are often associated with severe side effects. The use of herbal medicines for the prevention and treatment of different pathologies is in continuous expansion worldwide [11]. Recent studies found that different substances from plant sources not only afford gastroprotection but also accelerate ulcer healing. This may be as a result of the plants possessing anti-inflammatory properties, suppressing the neutrophil/cytokine cascade in gastrointestinal tract [2], promoting tissue repair through expression of various growth factors,exhibiting antioxidant activity [7], scavenging reactive oxygen species [10], showing anti-nucleolytic, cytochome P450 2F1 inhibitory acitivity, anti-necrotic and anti-carcinogenic activities [4]. *Ricinodendron heudelotii* is one of the plants alleged to poses therapeutic

properties. In their research, [13] reported that the ethanol seed extract of the plant, *Ricinodendron heudelotii* contains phytochemicals such as tannins, flavonoids, alkaloids, cardiac glycosides, terpenoids, saponins, combined anthraquinones, carotenoids and reducing compounds in varying concentrations.

2. MATERIALS AND METHODS

Plant Material

The dried seeds of *Ricinodendron heudelotii* were purchased from a local market in Port Harcourt, identified and authenticated in the Department of Plant Science and Biotechnology, University of Port Harcourt. The clean seeds were pulverized into powder.

Preparation of Extract

The ground powder was subjected to extraction using 99% ethanol in the ratio of 1:3 ground powder to ethanol. After 72 hours, the mixture was filtered using whatsmann filter paper and the extract was allowed to concentrate in a water bath at 92 degree Celsius to obtain a pure extract. The pure extract was stored at freezing temperature prior to its use for administration to the experimental animals.

Inducement of Ulcer

Aspirin (Acetylsalicylate) was prepared by dissolving 20gram in 5ml distilled water. A volume of 1ml of this solution contained 200 mg of Acetylsalicylate. Gastric ulceration was induced by administering 200mg/kg bw of Aspirin orally to the wistar albino rats for 3days, 24 hourly. On the fourth day, various degree of ulceration manifested.

Preparation of Omeprazole

Twenty grams of Omeprazole, a standard anti-ulcer drug was dissolved in 5ml of distilled water and given to group 2 rats which served as the treatment control group 24hourly for 7 days.

Experimental design

Thirty Wistar albino rats (80-120 g) were used. The animals were housed and maintained in cages for a period of 14 days to allow the animals to acclimatize. They were fed with the conventional rat feed and given free access to water. All animals were fasted for 24hours before use to ensure an empty stomach.

The animals were disparted into 5 groups with six animals in each group as shown below:

Group 1: Control: Feed + water.

Group 2: Reference Treatment: 200mg/kg/bw aspirin + 200mg/kg/bw omeprazole + feed and water

Group 3: Treatment 1: 200mg/kg/bw aspirin + 50mg/kg/bw ethanol extract *Ricinodendron heudelotii* seed + feed and water

Group 4: Treatment 2: 200mg/kg/bw aspirin + 100mg/kg/bw ethanol extract *Ricinodendron heudelotii* seed + feed and water

Group 5: Treatment 3: 200mg/kg/bw aspirin + 150mg/kg/bw ethanol extract *Ricinodendron heudelotii* seed +feed and water

Fecal occult blood test

The fecal occult blood test was carried out by placing the animal feces on a collection card, the portion of the collection card containing the sample was removed from the collection card, and the sample was mixed with buffer. The buffer solution was then introduced into a test device which contains polyclonal antibodies. The buffer solution migrated through the test device for 5 minutes. A coloured line at the "T" point indicated the presence of hemoglobin in the feces and vice versa. All animals were sacrificed by anaesthetizing via an overdose of chloroform inhalation, dissected and the stomachs were rapidly removed, opened along their greater curvature for further analysis and bioassaying.

Statistical Analysis

The analysis of variance (ANOVA) was used to compare means, and values were considered significant at $P< 0.05$. Poch hoc multiple comparison for differences between groups and within groups were established using least significant difference.

3. RESULTS AND DISCUSSION

Table 1: pH and volume of gastric juice

Groups	Aspirin&extract	Doses(kg/bw)	Gastricjuice volume(ml)	pHof gastric juice
1	-	-	0.1833 ± 0.0753^{a}	3.2833 ± 0.1472^{a}
2	Aspirin + omeprazole	200mg	0.2333 ± 0.1033^{a}	3.6167 ± 0.2483^{a}
3	Aspirin + extract	50mg	0.2000 ± 0.0633^{a}	3.7500 ± 0.1048^{b}
4	Aspirin + extract	100mg	0.1833 ± 0.0753^{a}	3.4833 ± 0.3545^{a}
5	Aspirin + extract	150mg	0.2200 ± 0.0833^{a}	3.5200 ± 0.1920^{a}

- Values are represented as Mean ± Standard deviation.
- Values with different superscripts show significant difference at the 0.05 confidence level ($P\leq 0.05$) when compared with the control group.
- Values with the same superscripts shows no significance at the 0.05 confidence level ($P\leq 0.05$) when compared with the control group.

Table 2: Fecal occult blood and *Helicobacter pylori* analysis result

Groups	FOB	*H. pylori*
Group 1	-VE	-VE
Group 2	-VE	-VE
Group 3	-VE	-VE
Group 4	-VE	-VE
Group 5	-VE	-VE

DISCUSSION

This research investigated the effect of ethanol seed extract of *Ricinodendron heudelotii* in aspirin-induced gastric ulcer in wistar albino rats. The animals exhibited physical reactions such as: rashes on the skin, low appetite for food and lacrimation, following the inducement of gastric ulcer. This reactions could be as a result of the side effects associated with a high dose aspirin intake [15]. The result on Table 1 shows a decrease in ulceration in the groups treated with the ethanol seed extract of *Ricinodendron heudelotii* in comparison with the control group. The qualitative and quantitative phytochemical screening of the seeds of *R. heudelotii [13]* shows that flavonoid was present with the highest concentration which could be a contributory factor to the decrease in ulceration as tannin and other phytochemicals have been reported to have wound healing properties, anti-inflammatory, anti-oxidant, and analgesic potency. Also present in the plant seeds is the Anthraquinone which helps to reduce inflammation while free anthraquinone which is not present in the seed extract [13] exhibit little therapeutic activities. Data from the analysis of the volume of gastric juice content revealed variations in the experimental groups of the animals in comparison to the control group. This variation however was not at the 95% confidence interval statistically. The pH of gastric juice showed an increase, however, the increase was not significant at $P \leq 0.05$ but varied in comparison to the control group. The results in Table 2 indicated the absence of *H. pylori* in Groups 1,2,3,4 and 5. This suggests that the gastric ulcer was not as a result of the presence of *helicobacter pylori* but induced by the administration of aspirin to the experimental rats. The fecal occult blood test showed a decrease in ulceration as the concentration of the seed extract increased. The decrease in ulcer indices is in conformity with those of [6] who reported decrease in ulcer indices on treatment with banana in aspirin induced rats and [1] who also reported the decrease in ulcer indices on treatment with *piper longum linn, Zingiber officinalis linn and Ferula* species in aspirin induced gastric ulcer rats.

4. CONCLUSION

The result of this work indicates the potency of the ethanol seed extract of *Ricinodendron heudelotii* to ameliorate Aspirin-induced gastric ulcer in wistar albino rats with increased concentration. Ethnopharmacological treatment using the ethanol seed extract of *Ricinodendron heudelotii* thus has promising prospects for therapeutic use.

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CONFLICT OF INTEREST

Authors have no conflict of interest.

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