

Evaluation of The Healing Effects of Aqueous Extracts of Musa Paradisiaca (Unripe Plantain) And Brassica Oleracea (Cabbage) on Peptic Ulcer.

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Abstract:

Background: Peptic ulcer results from an imbalance between ulcer promoting factors (gastric acid, pepsin secretion) and ulcer preventing factors (gastric mucosa, prostaglandins). Unripe plantain and cabbage when used individually were effective in the treatment of peptic ulcer in folkloric medium. This hereby paved way for this research that involved the co-administration of aqueous extracts of *Musa paradisiaca* (plantain) and *Brassica oleracea* (cabbage) in the treatment of peptic ulcer.

Objectives: To evaluate the healing effect of the aqueous extracts of *Musa paradisiaca* (plantain) and *Brassica oleracea* (cabbage) on peptic ulcer in rats, and the possible effect of these materials as prophylaxis against peptic ulcer. This could pave way for the production of anti-peptic ulcer drugs for use in clinical medicine.

Methodology: A total of 45 rats of both sexes weighing 200-250g were used for this study. In the prophylactic study, 15 adult albino wistar rats were used. The animals were grouped into 5 groups of 3 animals each and were starved for 24 hrs before the experiment. Group 1 received 0.3ml of distilled water, group 2 received 100mg/kg of cimetidine, group 3 received 100mg/kg of *Brassica oleracea* extract, group 4 received 100mg/kg of *Musa paradisiaca* extract and group 5 received a combination of *Musa paradisiaca* and *Brassica oleracea* extracts at the dose of 50mg/kg+ 50 mg/kg.

1 hr post treatment, peptic ulcer was induced in all the animals by a single oral administration of 30mg/kg of Indomethacin. 8 hrs after ulcer induction, each animal was sacrificed and the number of lesions in the stomach was counted. In the curative study, a total number of 30 rats were used. They were grouped into 5 groups of 6 animals each. The animals were denied access to food and water for 24hrs. Ulcer was induced in all the groups by single oral administration of 30mg/kg indomethacin. 8 hrs post ulcer induction, 2 animals from each group were sacrificed and the number of ulcer counted. The remaining animals in each group received treatment as follows: group 1 received 0.3ml of distilled water, group 2 received 100mg/kg of cimetidine, group 3 received 100mg/kg of *Brassica oleracea* extract, group 4 received 100mg/kg of *Musa paradisiaca* extract and group 5 received 50mg/kg combination of *Musa paradisiaca* and *Brassica* extract. They received the treatment for three days, then another 2 animals from each group were sacrificed and their number of ulcers counted.

The remaining animals contained to receive treatment for another three days before their ulcer index were determined.

The LD 50 test was carried out using the Lorke's method. The phytochemical analysis was conducted using the trease and Evans method.

Results: It showed that the co-administration of aqueous extract of *Musa paradisiaca* and *Brassica oleracea* possessed peptic ulcer healing activity, and had more of prophylactic effect than curative effect.

It also showed that the separate dose of *Musa paradisiaca* extract and *Brassica oleracea* possesses more curative anti ulcer action when used individually than when co-administered.

Conclusion: The extracts of *Musa paradisiaca* and *Brassica oleracea* has peptic ulcer healing activity. This could find some relevance in the treatment of peptic ulcer disease. Clinicians and pharmacologists will find this study highly relevant with a view to actually formulating a medicament from the extracts for use in the treatment of peptic ulcer disease in man.

Key Words: *Musa paradisiaca*, *Brassica oleracea*, peptic ulcer.

I. Introduction

Musa paradisiaca (plantain fruit) is an important food in the humid tropical zone of Africa ⁽¹⁾

It is undoubtedly one of the oldest cultivated crops in West Africa. It is called Ojoko by the Igbos in Nigeria. It has about 40 species and it is a perennial carbohydrate food crop with gestation period of 14 to 20

months. The plant has a dark green foliage leaves with distant parallel ribs along their length. Its major harvest occurs between September and March⁽¹⁾. It contains flavonoids which contribute to its use in the treatment of certain diseases⁽²⁾

Cabbage which is known as *Brassica oleracea* is a popular leafy vegetable. It is a herbaceous, biennial, dicotyledonous flowering plant.

Traditional healing system plays an important role in health care delivery of many nations, and about 70% of the world's population has incorporated traditional medicine into their primary modality of healthcare medicinal herbs constitutes the base of traditional medicine worldwide⁽⁴⁾.

Research in medicinal plants has provided scientific basis for the use of whole plants or parts of it for treatment of some ailments⁽⁵⁾. Unripe plantain (*Musa paradisiaca*) is a good source of carbohydrates and also rich in potassium and provitamin A. (carotene)⁽⁶⁾. Besides its folkloric use in the treatment of peptic ulcer, *Musa paradisiaca* is also effective in the treatment of disorders like diarrhea and vomiting⁽⁷⁾.

Its main constituents are carbohydrates, alkaloids, glycosides, saponins, proteins and steroids⁽⁸⁾. Plantain leaf can be considered as a "green bandage" as it has healing properties useful in the treatment of skin infection, wounds and rashes⁽⁹⁾. *Musa paradisiaca* leaf poultices are also used in the treatment of toothaches and gum abscesses⁽¹⁰⁾. Unripe plantain when used as an expectorant, helps to expel phlegm from the respiratory tract⁽¹¹⁾. It also has astringent properties which is used in folkloric medicine for the treatment of urinary tract infections and haemorrhoids⁽¹²⁾.

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On the other hand, cabbage (*Brassica Oleracea*) is extremely nutritious whether taken as meal or as medicine, and is an excellent source of vitamin C and glutamine^{(13), (14)}.

Fresh *Brassica oleracea* juice besides its anti-peptic ulcer property, is also useful in the treatment of cancer, and gastrointestinal diseases^{(15), (16)}.

II. Materials And Methods

Drugs and Other Materials Used

Cimelidine, Indomethacin, distilled water, electronic weighing balance, syringes, grinder, mortar and pestle, mechanical weighing balance, dissecting set, filter paper, rotary evaporator, oven, mechanical shaker, powdered samples of *Musa paradisiaca* and *Brassica Oleracea*

Collection And Identification of Plant Material

The unripe plantain and cabbage used for this work were purchased from a local market at Owerri Imo State and sent for identification at the pharmacology department of Madonna University Elele.

Preparation Of Aqueous Extract

The unripe plantain and cabbage fruits were peeled, sliced into tiny pieces, sundried and milled to powder afterwards using an industrial grinding machine.

Aqueous extraction was done with cold distilled water by soaking 300g of *Musa paradisiaca* powder and 200g of *Brassica Oleracea* powder separately in 1000mls of distilled water each, and placed on a mechanical shaker for 48 hrs. Their mixtures were then filtered into a glass bottle using a clean white handkerchief. They were further filtered with filter paper and concentrated using a rotary evaporator.

Afterwards they were oven dried with hot air oven at 50°C. Their concentrates were then assessed for activity against indomethacin induced ulceration by the prophylactic and curative procedures.

Phytochemical Test

It was carried out on the extracts using the Trease and Evans procedure. It showed the presence of some active biological agents that could be responsible for their various curative actions.

Experimental Animals

Adult wistar rats (200-250g) and mice (67-90g) of either sex were used for this study. The animals were sourced from the animal house of the department of Zoology, University of Nigeria Nsukka. They were kept in the department of pharmacology of Madonna University and they had free access to food and clean water. Permission was obtained from the ethical committee on animal use of Madonna University Elele before the research was conducted.

Acute Toxicity Test

Dietrich Lorke's method was used. ⁽¹⁷⁾ It employed the use of 13 mice in two stages. The first stage was a preliminary trial using 3 different doses of the extracts. The animals were grouped into 3 groups of 3 animals each. Group 1 received a single oral dose of the extract at 10mg/kg, Group 2, received 100mg/kg, while group 3 received 1000mg/kg. The animals were constantly monitored for the first 2 hours post administration and the intermittently for the next 6 hrs and then 24 hrs.

The number of deaths were noted. From the result of the first stage, the second stage was carried out. In this stage, the animals were grouped into 4, each having one animal. The first group received 1500mg/kg of the extract, group 2 received 2500mg/kg, group 3 received 3500mg/kg while group 4 received 5000 mg/kg. The animals were monitored for a period of 24hrs and the number of deaths also noted. This test was carried out on both Musa paradisiaca and Brassica Oleracea extracts.

Anti Ulcer Test

Prophylactic Test

15 adult wistar rats were used for this test. The animals were grouped into 5 groups of 3 animals each and they were starved for 24hrs prior to the experiment. Group 1 received 0.3ml of distilled water, group 2 received 100mg/kg of cimetidine, group 3 received Brassica Oleracea extract at the dose of 100mg/kg, group 4 received 100mg/kg of Musa paradisiaca extract, while group 5 received a combination of Musa paradisiaca and Brassica Oleracea extract at the doses of 50mg/kg + 50mg/kg. hour after treatment, ulcer was induced in each of the animals by a single oral administration of 30mg/kg of indomethacin, 8 hrs after the ulcer induction, each animal was sacrificed and their stomach dissected out. It was ligated along the greater curvature. Then it was held with the finger and a stream of water ran through it to wash it, then the number of ulcers were counted.

Curative Test

In this test, a total of 30 rats were used. They were grouped into 5 groups of 6 animals each. The animals were starved of food and water for 24hrs. Then ulcer was induced by a single oral dose of 30mg/kg of indomethacin, 8 hrs post ulcer induction, 2 animals from each group were sacrificed and the number of ulcers counted using the procedure as was described in the prophylactic test.

The remaining animals in each group received treatment as follows:

Group 1 received 0.3ml of distilled water, group 2 received 100mg/kg cimetidine, group 3 received 100mg/kg of Brassica Oleracea extract, group 4 received 100mg/kg of Musa paradisiaca extract, while group 5 received a combination of both extracts at a dose of 50mg/kg + 50mg/kg. They received the treatment for 3 days, then another 2 animals from each group were sacrificed and their number of ulcer lesions counted. The remaining animals continued to receive treatment for another 3 days before their ulcer index were determined.

Statistical Analysis

Results were expressed as mean + standard error of mean (SEM). The significance of difference between means of control and treated groups were determined by one way analysis of variance (ANOVA). Results were regarded as significant with $P < 0.05$ or not significant with $P > 0.05$.

III. Results And Tables

Table 1: Phytochemical analysis result of M. Paradisiaca

Phytochemical constituent	Degree present
Carbohydrates	+++
Reducing sugar	+
Alkaloids	+++
Glycoside	+++
Saponin	+
Protein	++
Steroid	+

Key:

+++ = Present in large amount

++ = Moderately present

+ = Present in trace amount

Table 2: Phytochemical analysis results of *Brassica Oleracea*.

Phytochemical constituent	Degree present
Carbonhydrates	+++
Alkaloid	+++
Glycoside	+++
Reducing sugar	++
Protein	++
Steroids	++
Saponin	+

Key:

- +++ = Present in large amounts
- ++ = Moderately present
- + = Present in trace amount

Table 3: Acute Toxicity Test Result of *M. paradisiaca*

Stage	Dose mg/kg	Number of deaths	Number of survivals
1	10	0/3	3/3
	100	0/3	3/3
	1000	0/3	3/3
2	1500	0/3	1/1
	2500	0/1	1/1
	3500	0/1	1/1
	5000	0/1	1/1

LD50 > 5000 mg/kg

Table 4: Acute Toxicity Test Result of *B. Oleracea*

Stage	Dose mg/kg	Number of deaths	Number of survivals
1	10	0/3	3/3
	100	0/3	3/3
	1000	0/3	3/3
2	1500	0/1	1/1
	2500	0/1	1/1
	3500	0/1	1/1
	5000	0/1	1/1

LD50 > 5000mg/kg.

Table 5: Result of Prophylactic treatment with Cimetidine and extracts. Mean + SEM

Group	Agent and dose	No animals used	No animals of having ulcer	Percentage having ulcers %	Ulcer index	Percentage ulcer inhibition %
1	Distilled water (0.3ml)	3	3	100	2.9 ± 1.10	0
2	Cimetidine (100mg/kg)	3	1	33.33	*0.4 ± 0.11	86.21
3	<i>Brassica Oleracea</i> extract (100mg/kg)	3	2	66.66	*0.25 ± 0.05	91.38
4	<i>Musa paradisiaca</i> extract (100mg/kg)	3	2	66.66	*0.6 ± 0.20	79.32
5	<i>M. paradisiaca</i> + <i>B. Oleracea</i> extracts (50mg/kg + 50 mg/kg)	3	3	100	*1.18 ± 0.4	59.32

Keys: * = Significant (P < 0.05)

Table 6: Result of curative treatment with cimetidine and extracts.

Group	Dose and agent	Mean + SEM			Percentage ulcer cure (%)
		Day zero ulcer index	Day 3 ulcer index	Day 6 ulcer index	
1	Distilled water (0.3ml)	3.0 + 0.25	4.1 + 0.15	2.9 + 0.27	3.34
2	Cimetidine (100mg/kg)	2.3 + 0.18	*1.0 + 0.04	*0.3 + 0.03	86.96
3	Brassica oleracea extract 100mg/kg	2.9 + 0.21	*1.9 + 0.06	*0.7 + 0.04	75.87
4.	M. Paradisiaca extract 100mg/kg	1.9 + 0.21	*0.3 + 0.02	*0 + 0.00	100
5	Musa paradisiacal Brassica + oleracea 50mg/kg + 50mg/kg	2.5 + 0.11	ns 2.1 + 0.03	1.9 + 0.00	24

Keys:

ns = Not significant (P> 0.05)

* = Significant (P<0.05)

Ulcer index = $\frac{x}{10}$

where x = $\frac{\text{total mucosal area}}{\text{total mucosal lesions}}$
(Kunchandy's method)

$$\text{Percentage ulcer cure} = 100 - \left[\frac{z \times 100}{y} \right] 1$$

Where:

Z = day 6 ulcer index of the group.

Y = day 0 ulcer index of the group.

From the result, the co-administration of aqueous extracts of *Musa paradisiaca* and *Brassica oleracea* presented more prophylactic than curative effect. In the prophylactic test, *Brassica oleracea* possessed the highest percentage of ulcer protection. In the curative test, *Musa paradisiaca* extract possessed the highest percentage of ulcer cure.

Ulcer index

= $\frac{x}{10}$

Where x = $\frac{\text{total mucosal area}}{\text{Total mucosal lesions}}$
(Kunchandy's method)

Calculation of % ulcer inhibition

$$= 100 - \left[\frac{X}{Y} \times 100 \right] 1$$

Where X = group treatment value

Y = control mean value.

The result shows that co-administration of the aqueous extracts of unripe fruits of *Musa paradisiaca* and *Brassica oleracea* possessed prophylactic activity against ulcer induction by indomethacin. Cimetidine, and separate administrations of *Musa paradisiacal* and *B. Oleracea* presented lesser ulcer index than the co-

administration of both extracts. The results is in line with the investigation of anti ulcer activity of co-administration of aqueous extracts of Musa paradisiaca and Brassica oleracea

1. FIGURES

Figure 1: Graph of percentage ulcer inhibition against dose and agent.

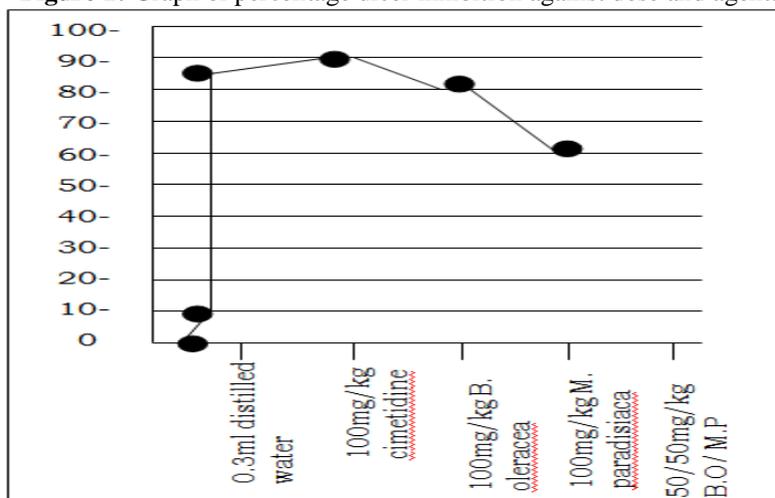
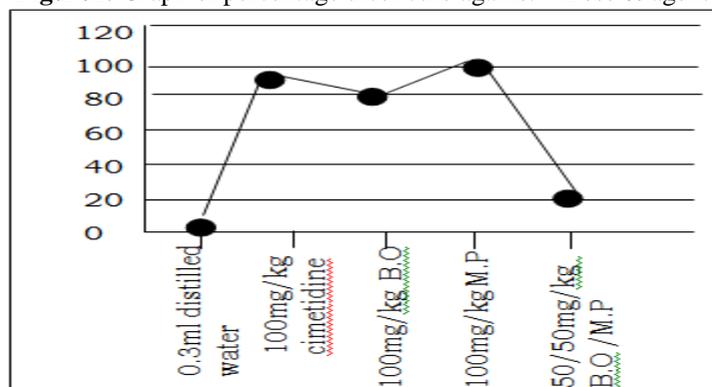


Figure2: Graph of percentage ulcer cure against Dose & agent.



IV. Discussion

The result showed that the co-administration of aqueous extracts of Musa paradisiacal and Brassica oleracea possessed the activity of inhibiting peptic ulcer induced by indomethacin, a potent non steroidal anti inflammatory drug⁽¹⁸⁾ The value of ulcer inhibition obtained was 59.32%. The result also showed that the co-administration of both extracts possessed more prophylactic than curative effect. The value obtained from the prophylactic result test was 59.32% while that of the curative test was 24%. This effect was found in albino rats.

The curative test showed that there was an ulcer index number reduction with respect to the extension of period of co-administration of Musa paradisiacal and Brassica oleracea extracts. The result also showed that cimetidine and separate administration of Musa paradisiaca and Brassica oleracea extract possessed higher prophylactic and curative activity than the co-administration of Musa paradisiaca and Brassica oleracea⁽¹⁸⁾

Peptic ulcer treatment has undergone many strides over the past few years and a number of drugs are now available for its treatment. All these drugs have brought about remarkable changes in ulcer therapy but their efficacy is still debatable due to high rate of reoccurrence. As a result, the search for the ideal anti ulcer drug continues and has also been extended to herbal drugs in search of new molecules which can afford better protection and reduce the incidence of relapse.

V. Conclusion And Recommendation

The result of the above study confirms the efficacy of the aqueous extracts of unripe plantain and cabbage for both the prevention and treatment of peptic ulcer, and its role in folkloric medicine as an anti ulcerogenic agent appears justified.

Clinicians and pharmacologists will find this study relevant with a view to actually formulating some conventional drugs from the extracts for use in the treatment of peptic ulcer in man.

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