



## THE PHYTOCHEMICAL ANALYSIS AND THE ETHANOLIC EFFECT OF BEETROOT (*Beta vulgaris*) EXTRACT ON WEIGHT CHANGES IN ALBINO RATS.

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### ABSTRACTS

This study was designed to assess the phytochemical properties, and the **ethanolic effects** of beetroot extract on weight changes in albino rats. The plant sample (*Beta vulgaris*) was purchased and was taken to Laboratory for analysis. It was washed, peeled, and dried for 20 minutes in the oven. It was ground using electric blender to fine particles. The sample was soaked in 30% ethanol for 24 hours, after which the extract was filtered and transferred into conical flask ready for test.. Fifteen (15) healthy male albino rats of average weight ranges from [4.5 - 6.6 grams] were obtained and divided into three groups, five(5) for each group. The phytochemical results showed the presence of Saponin, flavonoid, alkanoid, tannin and absence of Steroid. From the result on effects of beetroot extract on weight changes; the average body weight of the animals when administered the extract orally with doses of 20ml, 50ml, and 100ml respectively within a space of three weeks were significantly decreased when compared to the control group. This observation suggests that the plant helps to prevent weight gain in the rats, which can be effective for the control/treatment of obesity.

**Keywords:** Phytochemical, *Beta Vulgaris*, Analysis ,Albino Rat, Obesity.

### 1: INTRODUCTION

Beetroot (*Beta vulgaris*) also known as the common beet, garden beet, red beet, or table beet is a root vegetable in the Chenopodiaceae family. Other vegetables in this family include spinach, chard, quinoa, and sugar beets.[21]

It is noted that not all medicinal plants are safe for consumption in the crude form. Some level of toxicity may arise as a result of potential toxic compounds they contain and the application of pesticide during cultivation.[]

Beetroot is grown widely in Germany and France and in lesser amounts in other European countries, Africa, Asia and South America. It is now a popular salad vegetable. Beetroot is a true biennial that produces thickened root and a rosette of leaves during the first year followed by flowers and seeds during the second year. They are mainly grown for their swollen roots but the leaves can also be eaten as spinach. The flowers are very small with a diameter of 3 to 5 mm and are produced in dense spikes. They are green or tinged reddish, with five petals. The fruit is a cluster of hard nut lets.[]

Besides other active chemicals, beetroots contain a unique class of water-soluble, non-phenol antioxidants, the betalains, red betacyanins and yellow betaxanthines.[]

Beetroots have been shown to contain a variety of minerals: calcium, iron, magnesium, potassium, selenium, zinc) and vitamins (vitamin C, thiamin, vitamin B6, vitamin A, beta carotene, vitamin E, and vitamin K.[]).



Beetroot "*Beta vulgaris*" (Beet) is a plant which is included in Betoideae subfamily in Amaranthaceae family. It is economically most important crop of the large order Caryophyllales. The leaves of *Beta vulgaris* possess diuretic, purgative and anti-inflammatory activity, seeds known to possess expectorant and carminative properties, roots possess sedative, anti-ulcer and emenagogue effects.[]

The root is rich source of phytochemical compound, glycine, betaine, it has the property of lowering homocysteine one of the toxic metabolite. It has several cultivar groups: the sugar beets, of greatest importance to produce table sugar; the root vegetables known as beetroot or garden beet; the leaf vegetable known as chard or spinach beet; and mangelwurz, which is a fodder crop. [].

According to research, beetroot reduces blood pressure in hypertensive animals, especially mammals, so may have effect on mechanisms of cardiovascular disease. It has been found that dietary nitrate supplementation such as from beets and other vegetables results in a small to moderate improvement in endurance exercise performance.[16].

Beets contain betaines, which may function to reduce the concentration of homocysteine, a homolog of the naturally occurring amino acid cysteine. High circulating levels of homocysteine may be harmful to blood vessels, thus contribute to development of cardiovascular disease. (Injures et al., 2016).

Betanin, obtained from the roots, is used industrially as red food colorant, to improve the colour and flavour of tomato, paste, sauces, desserts, jams and jellies, ice cream, candy and breakfast cereals, among other applications.

The chemical a dipic acid rarely occurs in nature but happens to occur naturally in beetroot, The red colour compound betanin is not broken down in the body, and in higher concentration may temporarily cause urine or stools to assume a reddish colour in the case of urine a condition called becturia. Although harmless, this effect may cause initial concern due to the visual similarity to what appears to be blood in the stool, hematochezia (blood passing through the anus, usually in or with stool) or hematuria (blood in the urine).[18]

### **Aim**

The aim of this study is to determine the physical effect of ethanol extract of beetroot on albino rats.

### **Objectives:**

- i. To determine the Physical Effect of extract of beetroot on weight changes in albino rats.
- ii. To determine the Physical Effect of repeated aqueous extract of beetroot on weight changes in albino rats
- iii. To know the Physical Effect of oral administration of different doses of the extract on relative organ weights of rats.

## **2: MATERIALS AND METHODS:**

### **Equipment/Reagents**

The equipment and reagents used are as follows:



Test tubes  
Conical flask  
Electric blender  
Ferric chloride  
Mayer's agent (potassium mercuric iodide)  
Concentrated sulphuric acid  
Ammonia solution  
Distilled water  
Pipette  
Soaking method (70% of ethanol)

### **Plant Sample Collection**

The plant sample (*Beta vulgaris*) was purchased from Eke-Awka and was taken to Department of Science Laboratory Technology, Anambra State Polytechnic Mgbakwu (Biology Lab) for analysis and was also identified by a botanist in the same Institution.

### **Preparation of Plant Sample**

The sample (*Beta vulgaris*) was washed and dried in the oven for 20 minutes and was grinded using electric blender. The sample was soaked in 70% ethanol for 24 hours. The beetroot extract was collected and transferred into conical flask ready for test.

### **Animals Sample**

Fifteen (15) healthy male albino rats of average weight (135-185.0 g) were obtained from the animal house of the Department of Anatomy, School of Basic Medical Sciences, Nnamdi Azikiwe University Awka, Anambra State, Nigeria. They were maintained according to the guidelines of Committee for the Purpose of Control and Supervision of experiments on animals (National Research Council, 1997).

### **Preparation of Animal Samples**

The animals were kept in clean plastic cages that were floored with animal beddings. The animals had a 12 hours' light/dark cycle and the beddings changed daily. The animals were grouped according to sex and weight. The rats were fed with pelletized poultry finisher's mash feed.

### **Procedure for physical effect of ethanol extract**

The physical evaluation of *Beta vulgaris* was carried out using Lorke's method.

Fifteen (15) albino rats were used for this study and involved two phases; in phase I, there were three (3) rat per group as against control group that had distilled water. The extract was administered as follows: group I (normal rats that received distilled water), groups II, were orally administered 10 mg, 100 mg/kg body weight of aqueous extract respectively in a single dose using gastric gavage.[7]

In phase II, there were three treatment groups of one animal each (group III), and were orally administered 200 mg, 500 mg and 1000 mg/kg body weight of extract respectively in a single dose using gastric gavage. The animals were observed for mortality, signs of gross toxicity and behavioral changes one hour post dosing and at least once daily for 14 days. Body weights and feed intake were recorded before dosing and after the observation period.



### Procedure for Sub Physical effect

Three groups of two (4) animals each distributed according to weight (average body weight 135.0-185.0 g). The Acute toxicity study was for twenty-eight (28) days with daily administration of aqueous extract of beetroot.

The test groups received orally aqueous extract dissolved in distilled water at 10 ,50 ,100,200,500 and 1000 mg/kg body weight/day/rat. The normal control animals had distilled water. The animals were observed for signs of toxicity and mortality throughout the experimental period. At the 28th days the animals were fasted for 12 h and euthanized by decapitation.

The kidney, liver and heart were dissected, freed of adherent tissues and weighed in order to ascertain the Histological changes.[12]

### 3: RESULTS:

Table 1: Physical Effect of extract of beetroot on weight changes in albino rats.

Groups	Dosage (mg/kg)	Day 0	Day 14%	Weight Gain
Group I (Control)	Distilled water	140g	152g	12
Group II.	100mg/kg	151g	195g	44
Group III	200mg/kg	179g	197g	18

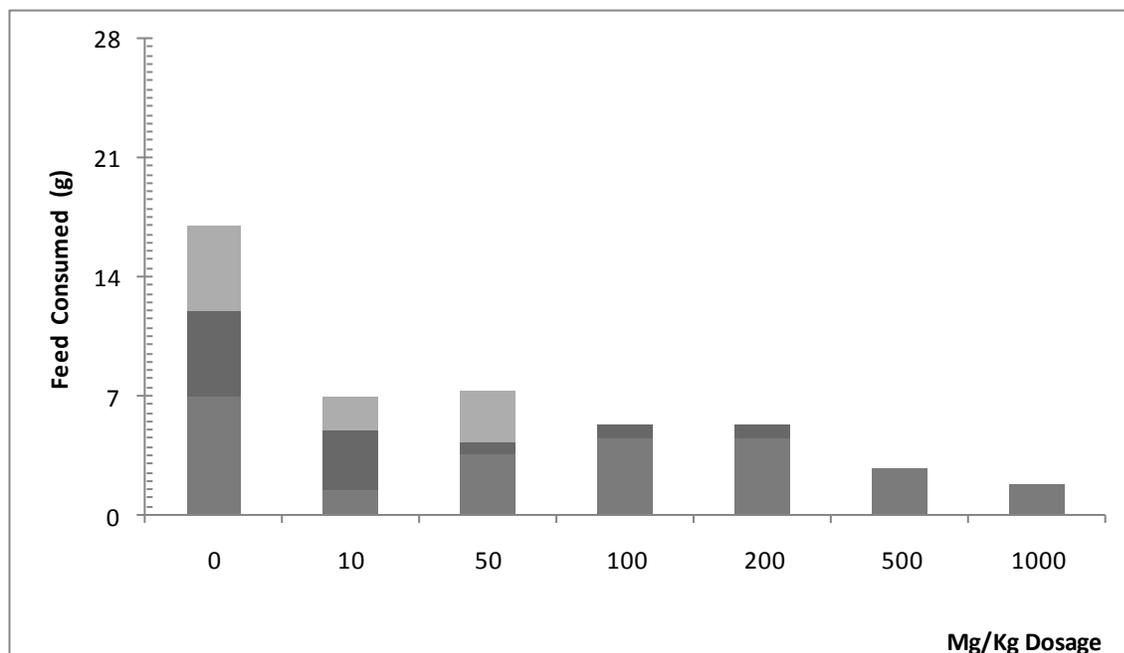
Table 2: Effect of repeated aqueous extract of beetroot on weight changes in albino rats

Days	Control Group 1	Group II Dosage(mg/kg)	Group III Dosage (mg/kg)
0	Distilled water	10	50
7	Distilled water	50	100
14	Distilled water	100	200
21	Distilled water	200	500
28	Distilled water	500	1000

Table 3: Physical Effect of oral administration of different doses of the extract on relative organ weights of rats

Weight of Organ(g)	Control (0mg)	Group 1(500mg)	Group 2 (1000mg)
Kidney	0.25	0.30	0.31
Liver	2.52	2.54	2.70
Heart	0.40	0.45	0.34

Figure 1: Effect of oral administration of differed doses of the extract on feed intake in Albino rat.



### Discussion

Table 1, shows the Effect of aqueous extract of beetroot on weight changes in albino rats. After 14 days of observation of the acute toxicity study, there was mortality or death recorded at the 1000 mg/kg/body weight of extract Therefore, the LD50value of Beta vulgaris extract administered orally is assumed to be from 1000 mg/kg body weight. During the oral administration 2(two) Albino rat gave birth during the process of the administration of beetroot extracts (the pregnancy period was 21-23 days) two weeks. The method described by Lorke was used to determine acute toxicity of the extract in albino rats.

Table 2, shows Effect of repeated aqueous extract of beetroot on weight changes in albino rats. Daily oral administration of aqueous extract of Beta vulgaris extract at tested doses 10, 50, 100 ,200, 500.and 1000g/kg body weight for 28 days , did not induce any obvious symptoms of toxicity or mortality in the rats, The average body weight of the animals administered the extract were significantly increased when compared to the control group .The feed consumed by the animals at10, 50, 100, 200, 500and 1000mg/kg of aqueous extract of beetroot were significantly increased when compared to the control.

Table 3, shows Physical Effect of oral administration of different doses of the extract on relative organ weights of rats. At 1000mg/kg of extract the relative organ weights kidney, liver, and heart were significantly increase when compared to the control.

Figure 1, shows the Effect of oral administration of differed doses of the extract on feed intake in Albino rats.



## CONCLUSION

The aim is to select a safe dose in human the plant extract is safe at low rate not in excess, This study presents the physical effects of beetroot aqueous extract on albino rats by LD50 using Lorke's method. A minimum dose of 10mg/kg and maximum dose of 1000kg/kg body weight were administered in single administration. In all doses rats treated with the extract show the food consumption, diarrhoea and urination. There were comparable body weight gains among the rats treated with the extract when compared with the control, not all the treated rats survived the 28th day observation.

According to the physical grading standard, when LD50 is greater than 1000mg/kg body weight, the extract is practically toxic, the presences of among the rats in some doses administrated seemed to support this claim; therefore, the single administration of an aqueous extract of Beta vulgaris can be said to be safe when use in low quantity when given orally. The administration of beetroot for 28day show the toxicity and mortality in the animals. The was changes in 50 and 100mg/kg refusal, tremor, 200 and 500 change in skin and diarrhoea, at 1000mg death occur. the investigated doses of beetroot extract shows that there was increase in body weight of animal over 28 day period when compared to control .and for medicinal use in low quantity because the excess is toxic to the body organ. [20]

## RECOMMENDATION

The administration of graded doses of beetroot extract to the animals show result of mortality and behavioural changes in the animals. The plant intake is safe for consumption at very low percent of it, the excess is causing disease to the body organ.

In human studies, it shows that beetroot supplementation has been reported to reduce blood pressure reduce cancer. I hereby recommend that further research should be carried out for the sub chronic toxicity to know the exact amount to be used for medicinal purpose.

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