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Activities of Principle Elements in Roasted Corn (*Zea mays*) and Cooked Corn and Their Effects on Some Biochemical and Gastro Intestinal System of Female Subjects in Emene, Enugu State.

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ABSTRACT

Cereals and vegetables have been sources of vitamins and energy for the survival of man, animals and birds, *Zea mays* is one of such cereals whose effects of its principal elements on some haematological, biochemical and gastro intestinal system of female subjects in Emene Enugu State were studied. The study consists of sixty (60) female subjects of age range 18-60 years who were fed with roasted corn (Group B) and cooked corn (Groups C) for 10 days. Analysis such as phytochemical analysis, some haematological analysis and biochemical studies were carried out using the blood samples from the subjects.

Result of the study indicates that carbohydrates and calcium elements are highly present in *zea mays* which serves as a source of energy in man, the haemoglobin concentration were slightly increased but within the normal range, no significant effect was noticed in protein, potassium and calcium concentrations in both groups (B & C). This slight increase in haemoglobin could be beneficial to women who are usually on monthly period.

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INTRODUCTION

In most developing countries especially the sub-saharan part of Africa the menace of hunger and economic hardship have driven everyone to simple natural foods, plants, herbs, roots and stem hence it is edible to survive.

Nutrition refers to the process of taking in and utilizing nutrients from food to support growth, maintenance and over all health of the body. It involves the consumption, digestion, absorption and utilization of nutrients including the macro nutrients such as carbohydrates, proteins and fats which provide energy and support bodily functions, the micro nutrients such as vitamins and minerals which supports various bodily functions such as immune function nerve function and bone health and finally water which is essential for hydration, temperature regulation and bodily function.

Maize (Zea mays) is known as corn in some English speaking countries. It is a large grain plant and the most important cereal in the world after wheat and rice with regard to cultivation areas and total production (Purseglove 1992, Osagie and Eka 1998).

The leafy stalk produces ears which contain the grain, which are seeds called kernels. Maize kernels are often used in cooking as a starch and pap. Corn is a feed that is widely consumed in many parts of the world. It can be prepared in various ways such as boiling, grilling, roasting or grinding into flow for baking. It is a good source of carbohydrates, fiber and some essential nutrients like vitamins and minerals. The primary purpose of roasting or cooking corn is to enhance its flavour and make it easier to digest. Rousting especially at high temperatures can caramelize the sugars in the corn, resulting in a sweeter richer taste. Cooking whether by boiling or steaming softens the kernels and makes them more palatable and digestible roasting and cooking can alter the availability of certain nutrients in corn. Roasted corn contains various chemical components that can affect the gastrointestinal tract (GIT). The roasting process itself can alter the nutritional composition, potentially impacting digestion and gut health. The key changes include a decrease in moisture content, a reduction in certain vitamins like B1, B2 and C and a decrease in some amino acids such as lysine, the levels of anti nutrients like phytates and oxalates which can hinder the absorption of certain minerals. This could potentially improve the bioavailability of minerals like Zinc and calcium in the GIT.

The gastro intestinal tract (GIT) is the system through which nutritive substances, Vitamins, mineral and fluids enter the body (Oguwike 2013).

Protein, fats and complex carbohydrates are broken down into absorbable units mainly in the small intestine. The products of digestion cross the mucosa and enter the lymph or the blood. This entry is called absorption . the gastrointestinal system is divided into five main parts namely mouth and pharynx, oesophagus, stomach small intestine and large intestine. Each one of this part has its specific function.

The digestive and absorptive functions of the gastrointestinal system depend on a variety of mechanisms that propel the food through the gastrointestinal tract, soften it and mix it with bile from the mucosal cells, salivary glands and pancreas.

Chemical contents of zea Mays: According to the united States, department of Agriculture (USDA), one ear of fresh corn contains sugar, (3gms) carbohydrates (17gms) fat (1gm), Dietary fiber (2gms), protein (3gms) vitamins such as Vit. A, Vit. C such as Thiamin Niacin, Panthothenic acid, folute, minerals such as potassium magnesium, phosphorus, manganese iron, zinc, and copper, amino acids and anti oxidants.

Medicinal Uses of corn:

A crop which is highly edible and nutritious as maize also has some medicinal uses among the local people. It can be used to alleviate some diseases such as (i) Gonorrhea: water from zea mays filtered through charcoal can be used as a treatment to cure gonorrhea (Abdul Rahaman, 1997). An effusion obtained from the stigma of maize inflorescence can be used in the treatment of urinary tract disease.

Millions of adults and children have food allergies. Some of those people are allergic to raw, cooked or roasted corn. Some tolerates cooked or roasted corn eaten without food in the stomach while some people do not tolerate roasted or cooked corn eaten in empty stomach. Some reactions include Hives (red; itchy skin bumps) or a skin rash.

Nausea (sick to the stomach), cramps, vomiting and diarrhea, running or stuffy nose, sneezing after eaten roasted or cooked corn, anaphylaxis and asthma.

Our curiosity to embark on this study is prompted by nausea and cramps in the stomach, some female subjects do experience after eating roasted corn without food in their stomach to also know the effect of zea mays on some haematological and biochemical profile of female subjects in Emene Enugu State

MATERIALS AND METHOD

Subjects:

These consist of sixty (60) female subjects within the age range of 18-60 years who likes eating roasted and cooked corn.

Experimental Design:

The subjects were divided into three (3) groups. Group A (10 subjects) is the control group, that did not take neither cooked or roasted corn. Group B (25 subjects) is the group on roasted corn eaten before taking their breakfast while Group C (25 subjects) is the group on cooked corn eaten before taking their breakfast.

Preparation of roasted and cooked corn:

Yellow and white corn were bought from a local market around our University and were sent to a taxonomist in the dept. of crop science for identification.

Preparation of roasted corn: Ganiyu et al, 2010.

The maize samples were roasted in the laboratory in an aluminium frying pan using a 1000w electric hot plate (Guangzhou D.G.H, Electrical appliances Co ltd. Guangdong, China) as the heat source. The pan was allowed to warm to a temperature of between 60^0C and 70^0C.

Subsequently 100g of maize samples were added at each time and heating continued with stirring until the temperature reached between 120^0C and 130^0C. Under this treatment, the grain was roasted to the desired consistency. The time required to roast each 100g sample was about 17 min. this was given to group B subjects for 10 days.

Boiling method was used to prepare a second set of the corn ears in a clean pot using a very neat water for 2hrs. These was also given to the group C subjects to eat for 10 days.

Phytochemcial analysis of zea mays:

Aqueous extract preparation of zea mays (corn) was screened for the prescence or absence of various secondary metabolites using standard phytochemica screening procedures as described by Harbourne (1973), Trease and Evans (1996). The extract was tested for calcium, alkaloids, flavenoids, resins, carbohydrates, reducing sugars, saponins, plycosides, steroids, ocidic compounds, fats and oil

Toxicity study (LD 50)

The LD 50 of the aqueous extract in abino mice was determined using Lorke's method (1983). The procedure of determining the lethal dose is by increasing the concentration of the extracts administered to the mice (per body weight) in each group consisting of eight (8) mice per group for five (5) days.

The concentration used are 500mg/kg, 1000mg/kg, 2000mg/kg, 3,000mg/kg, 4000mg/kg, 500mg/kg, 6,000mg/kg and 8000mg/kg body weight respectively. The mortality rate was determined and a graph plotted to determine the LD50.

Determination of haematological and biochemical profile of subjects:

Blood samples were collected from the cubital vein of the subjects into EDTA sequetremated bottles and plain bottles for analysis within hours. The haemoglobin concentration and packed cell volumes were determined according to the haematocrit method described by Alexander and Griffiths (1993), white blood cell count and platelet counts were estimated according to the visual method of Dacie and Lewis (1991).

The biochemical analysis were carried out as described by Baker (1985)

Statistical Analysis:

The results obtained in the study for all the haematological and biochemical analysis were represented as mean and standard deviation (mean± S.D), while student s-t-test was used to compare the result of the control and test

AP value of less than ($P<0.05$) or equivalent to ($P=0.05$) was considered statistically significant.

RESULTS

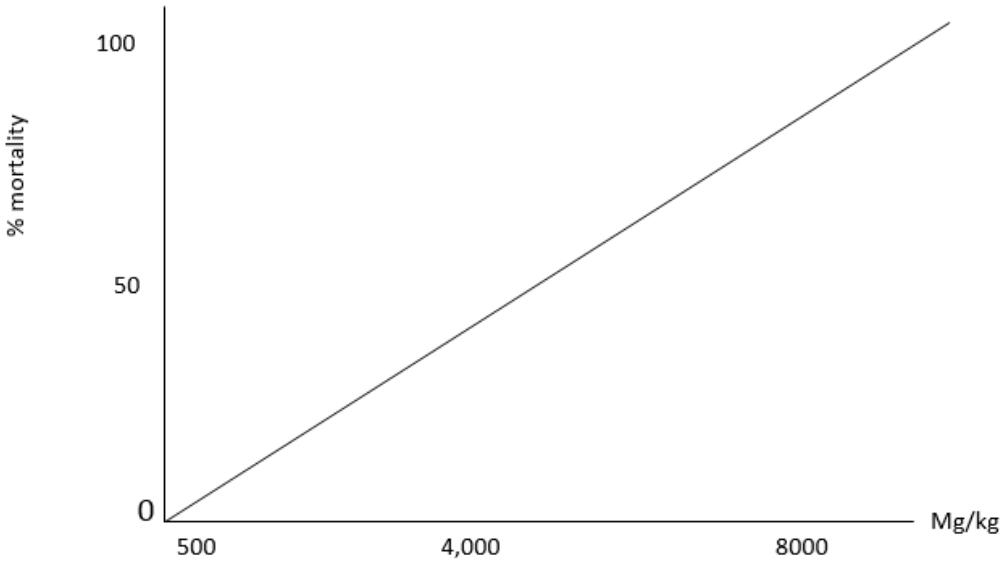
Table 1: shows the phytochemical study of zea mays

Constituents in zea mays	Carbohydrates	Calcium	Fats and oil	Glycosides	Educing sugard	Steroids, Resins, Terpenoids, Flarenoids, alkanoids
Degree of concentration	+++	++	+	+	+	_

Key:
(+++) present in high concentration, (++) present in moderate concentration (+) present in small concentration – Negative (absent)

Table 2: Haematological and biochemical profile of female subjects on Zea mays

Groups	Hb g/dl ± S.D	PCV % ±S.D	WBC/mm^3 ± S.D	Platelet count ± S.D	Potassium mno1±S.D	Calcium mf/dl±S.D	Protein mg/d (± S.D)
Group A control n= 10 corn free	12.0 ± 0.5	36.0 ± 1.0	4,105 ± 42	160 ± 22	3.8 ± 0.2	8.6 ± 0.4	74 ± 1.5
Group B n= 25 roasted corn for 10 days	12.4 ± 0.3	37.2 ± 0.9	4630 ± 37	174±18	4.5 ± 0.5	9.2± 0.2	74 ± 0.7
Group C n= 25 cooked corn for 10 days	12.6± 0.2	37.8 ± 0.6	4,450 ± 20	172 ± 10	3.9 ± 0.2	8.9 ± 0.4	74. 8 ± 0.5
P value	P> 0.05	P>0.5	P>0.05	P>0.05	P>0.05	P>0.05	P>0.05



Leg – concentration of extract (mg/kg) LD50 is 6,500mg/kg body weight

Figure 1: lethality study (LD 50) of Zea Mays (corn) showing the effect of administering graded doses (500-7000mg/kg 1.p) in mice against the percentage mortalities

DISCUSSION

Roasting and cooking corn (Zea Mays) have been a common practice in our region. This practice depends on the way one wants to eat the corn. However, roasting corn on a grill or in the oven can create a smoky, slightly chaned flavor that may be appealing to the consumer but may in turn start up an unexpected and uncomfortable stomach disturbances when eaten in an empty stomach. Roasted corn though a popular snack, contains various chemical components that can affect the gastro intestinal tract (G.T). The roasting process itself can alter the nutritional composition potentially impacting digestion and gut health. Key changes that occur in roasted corn include a decrease in moisture content, a reduction in certain Vitamins such as Vit. B, B2 and C and possibly a decrease in some amino acids.

The phytochemical study of Zea Mays (corn) (Table 1) shows that Zea mays contains high concentration of carbohydrates and calcium. Other substances present are dietary fibre (2gms), protein (3gm). Vitamins and other minerals.

Carbohydrate as a principle in Zea Mays exists in form of glucose and glycogen and serves as an important source of energy for Vital activities (Mayes et al, 1973).

There is a slight increase in the haemoglobin concentration and packed cell volume though within the normal range in the group B subjects that ate roasted corn.

The slight increase could be advantageous to the females who are usually on monthly period and keep them from being anaemic Zea mays may contain a principle element that can assist erythropoietic systems in the body. Carbohydrates are simple molecules that are broken down by digestion by addition of water into simple sugars.

Calcium and protein concentrations were within the normal levels (Table 2) throughout the research study. This could be linked with proper metabolism of sugar in the body of subjects to produce energy. Calcium ions and potassium ions play major role in muscle contraction and relaxation. Both electrolytes help regulate nerve function and transmission. Abnormal levels can affect heart rhythm and function.

In figure 1, the lethality study of Zea Mays gave 6,500mg/kg 1.p in mice, therefore it is safe to use it for days without harm. On the gastro intestinal system, roasted corn contain chemical components that can affect it causing potential irritation if consumed in an empty stomach. The maillard reaction products and volatile compounds produced during roasting could potentially irritate the GIT in some, individuals, especially those with sensitive digestive system. Some people are allergic to raw or cooked corn. Some of their reactions include Nausea, cramps, vomiting, diarrhea, running or stuff nose and sneezing.

Activities of principle elements in roasted and cooked corn (Zea Mays) and their effects on some haematological, biochemical and gastro intestinal system of females has been educated.

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