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X- Ray of Bacterial Contaminants, Haematological and Biochemical Profile of Male Kindergarten Subjects on ZEA Mays (Corn) Extracts (Pap) In Enugu State, Nigeria

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Abstract: *Cereals and vegetables have been sources of vitamins and energy for the survival of man, animals and birds;Zea maysis one of such cereals whose effects were studied by x-raying the bacterial contaminants, haematological and biochemical profile in male kindergarten subjects of age range 1-2yrs. Results obtained from the study indicated increment in haemoglobin concentrations, packed cell volume (P<0.05), white blood cell count (P<0.05), platelet count (p<0.05). protein level, calcium level and glucose concentrations were unaffected (P>0.05). There was no bacterial contaminants harmful to the human system isolated in the culture tests carried out. When the effect of consumption in the body is compared to that of consumption of complan milk (A factory nutritious milk) by other children (Group D), it will be observed that Zea mays extract (Pap) virtually has equal effect in the body as complan milk. It could be deduced from this study that Zea mays contain some active principles that is beneficial to the healthy being of kindergartens.*

Keywords: *Zea mays, protein level, haemoglobin levels, glucose, pap, white blood cell count.*

I. Introduction

Maize (Zea maysL. poaceae) is known as corn in some English speaking countries 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. Maize was introduced into Nigeria probably in the 16th century by the Portugese (Osagie and Eka, 1998). In Nigeria, maize is known and called by different vernacular names depending on locality like "oka" (Igbo), "agbado", "Igbado", or "yangan" (Yoruba), "masara" or "dawar masara" (hausa), "apaapa" (ibira) and "igumapa" (Yala). Maize is prepared and consumed in a multitude of ways which vary from region to region or from one ethnic group to another (Abdulrahaman et al, 2006). For instance, maize grains are prepared by boiling or roasting as paste (eko), 'aggbado' and 'elekute' in Nigeria and 'kenke' in Ghana or as popcorn which is eaten all over West Africa. Corn extract (pap) is a staple food for children below 1-2yrs.

Nutritive Value And Chemical Composition Of Maize:

Maize is an all-important crop which provides an avenue for making various types of foods. It can be used to produce pap, tuwo (Yoruba), tueo-masara (hausa), 'inioka' (igbo); 'uka apapa' (ibira). There are significant amounts of data on the chemisl composition of maize chemical composition after processing for consumption is affected by the physical structure of the kernel, by genetic and environmental factors, by processing and by other links in the food chain (Wikipedia, 2013). There are important differences in the chemical composition of the main parts of the maize kernel. The seed-coat or pericarp is characterized by a high crude fibre content of about 87% which is constituted mainly of hemicellulose 67%, cellulose 23% and liginin 0.1%. the endosperm contains a high level of starch (87.6%) and protein levels of about 8%. Crude fat content in the endosperm is relatively high level of protein 18.4% and minerals.

Hence the chemical contents of Zea mays can be listed as follows;

Contents	Percentage
Protein in pericarp, In endocarp, In germ,	3.7% 8.0% 18.4%
Crude fibre in pericarp, In endocarp In Germ	86.7% 2.7% 8.8%
Ether extract in pericarp In endosperm In Germ	1.0% 0.8% 33.2%
Ash in epicarp In Endosperm In the germ	0.8% 0.3% 10.5%
Starch in pericarp Endosperm Germ	7.3% 87.6% 8.3%
Sugar in pericarp Endosperm Germ	0.34% 0.62% 10.8%
And vitamins	

Medicinal Uses Of Grain:

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 treatment of urinary tract disease (Abdul Rahaman, 1997). Water obtained during the preparation of pap is used to soak bark or root of some plants. This is used to treat fever and malaria. Water obtained from the cold-pap is more effective than that from the hot pap.

Certain organisms can be contracted accidentally during preparation and processing of pap with cold water. Such organisms are waterborne organisms such as Salmonella, Shigella, Entamoeba histolyca, cholera and amoebic pathogens. To x-ray the presence of these bacterial contaminants in thepap that is commonly used by low income group of the population the haematological biochemical profile of the kindergatens that feed on Zea mays are the aim of this study.14 subjects)

II. Materials And Methods

Subjects: The subjects consist of four groups viz; toddlers that do not like to drink pap (control A); toddlers that like to drink pap mildly (Group B; 14 subjects), those who are chronic consumers of pap (Group C 14 subjects) and subjects on complan milk (Group D, 14 subjects on complan milk). All the group are within the age range of 1-2 yrs respectively.

Experimental Design:

Young mothers who come to health centres in our locality at Emene Enugu State Nigeria were convinced to administer corn extracts (Pap) to their toddlers (1-2yrs) for 30 days duration of the study. The caked pap paste were bought from pap devendors around the vicinity and were distributed dailyto the mothers during the period of study to be used in making ho pap which administer to their children within the study to be used in making hot pap which they administer to their children within the study groups. A total of 56 male children were used for this study. The juies extracted from the caked pap paste were taken and cultured into culture plates and reading were taken after 24-48hrs incubation. This is to check the possible presence of bacterial contamination in the water used.

Preparation Of Pap: To prepare pap, the maize grains are soaked in cold water (Abdulrahman et al, 2006) inside an earthen pot or clay pot (koko) for 2 to 3 days. Then the grains are washed with clean water severally and later ground to paste. Water is added and left for days with change of water at interval. The ground paste is filtered using clean white cloth to get very smooth paste. At this stage, amount desired maybe taken, stirred and poured inside boiling water and stirred until a semi-liguid porridge (hot pap) is obtained. This will then be allowed to cool to 45^0c, before being fed to the child by the mother. Few cubes of sugar maybe added to improve the taste.

Detection Of Food Borne Pathogens In Pap: The juice from the grounded filtered paste of maize can be collected and examined for identification and detection of pathogens using the following methods;

Salmonella: To identify salmonella and enterobactrial organisms, water from filtered paste was plated in duplicates into violet red glucose agar (oxoid) plates using wire loops and incubated at 32^0c for 24-48 hrs.

Staphylococci: To identify staphylococcus aureus, appropriate dilutions were spread-plated in duplicate plates of Manitol sail Agar (oxford) and incubated at 30-32^{0}c for 24 to 48 hrs.

Shigella: To identify shigella, fluid samples from the corn extracts were plated into cled medium and incubated for 24hrs. Shigella organism will be identified by its peculiar characteristic swarming in the plate.

Haematological Analysis: The hemoglobin estimation was determined by method described by Baker et al, 2007. The Packed cell volume estimation was done as described by Breecher and Cronkite (1950).

Biochemical Analysis: The blood estimation is estimated by described by Baker et al 1998. The Serum Protein is estimated by the method of Biuret method as described by Baker et al 1998. Blood sugar analysis was estimated using B. G meter.

Phytochemical Analysis Of Maize: The kernels of Zea mays were screened for the presence or absence of various secondary metabolites using standard phytochemical screening procedures as described by Harbournes (1973), Trease and Evans (1996) respectively. The extract was tested for calcium, alkaloids, flavonoids, glycosides, reducing sugars, fats and oil, carbohydrates, steroids, acidic compounds and tanins.

Collection And Preparationof Blood Samples For Study: Blood samples were obtained from the cubital fossa of the control and test subjects after 30 days feeding on pap. 5.0ml of blood was distributed in anticoagulant bottles (2.0ml) and into plain test tubes (3.0ml) which was left to clot and later the serum samples were aspirated and used to run protein and calcium tests. Samples collected in anti-coagulant samples were used to run haematology tests. Extreme care was taken to ensure proper and reliable results. Fluoride bottle were used to collect samples for blood sugar tests.

Statistical Analysis: The results obtained in the research were presented as mean and Standard deviation (Mean ± S.D). Students t-test was done to determine the level of significance.

III. Results

Table 1: Phytochemical analysis of Zea mays.

CONSTITUENTS IN TEXTRACT OF ZEA MAYS						
	Carbohydrate	Calcium	Fats and oil	Glycosides	Reducing sugars	Steroids,Resins TerpenoidsSaponins FlavenoidsAlkaloids
Degree of Concentration	+++	++	+	+	+	-

+++ Present in High concentration
++ Present in moderate concentration
+ Present in small concentration
- Negative (absent).

Table 2: Degree of Bacterial Contaminations in extract of Zea mays (pap).

EXTRACTS	Staph aureus (Bacteria)	Shigella (Bacteria)	Salmonella species (Isolated)	Normal Flora
CORN (PAP)	Negative (Absent)	Negative (Absent)	Negative (Absent)	Mild

Negative (Absent) indicates complete absence of pathogenic bacterial contamination in pap.

Table 3: Haematological and Biochemical profile of male toddlers (1-2yrs) on Zea mays.

GROUPS	Hbg/dl ± S.D	PCV% ± S.D	WBC/mm^3 ± S.D	Platelet count x 10^9/l ± S.D	Calcium mg/dl ± S.D	Protein mg/dl ± S.D	Glucose (RBS) mg/dl ± S.D
Control n=14 (A) Extract Free	12.8 ± 2.1	36.0 ± 4.2	4380 ± 54	165 ± 30	9.0 ± 0.5	76.2 ± 1.7	91 ± 0.8
Mild consumers n=14 (B) after 30 days of Zea mays	13.5 ± 0.5	40.0 ± 1.5	4540 ± 16	172± 25	9.4 ± 0.7	65.4 ± 0.5	95 ± 0.6
Chronic consumers n=14 30 days after Zea mays	14.5 ± 0.7	43.0 ± 2.1	5150 ± 32	188 ± 45	9.6 ± 1.2	68.6 ± 1.2	95 ± 0.4
Consumers of Complan Milk n=14 (D)	14.8 ± 0.5	43.0 ± 1.5	5160 ± 28	195 ± 32	9.8 ± 1.2	72.3 ± 1.5	95 ± 0.4
P. value	P<0.05	P<0.05	P<0.05	P<0.05	P>0.05	P<0.05	P>0.05

IV. Discussion

The bacterial contamination of fermented Zea mays extract (pap), the haematological and biochemical profile of toddlers feeding on it have been studied. In this study, it was observed that there is presence of typical plant constituents in Zea mays such as carbohydrate, calcium, reducing sugar, fat and oil, and glycosides while there is absence of alkaloids, saponins, terpenoids, flavonoids, tannins, resins, steroid. The results in table 2 indicate complete absence of pathogenic bacteria such as Eschericia coli, Staphyloccocus aureus, Samonella species, Shigella and small presence of normal flora in the corn extract. This could be due to the method of preparation. The process of fermenting maize, sorghum, millet or rice to produce Ogi not only removes parts of the maize kernel such as the seed coat and the germ, but also involves washing, sieving and decanting (Wikipedia, 2013), all of which induce changes in the chemical composition and nutritive value of the final product.

More also the process of preparing hot pap using boiling water could kill bacteria, both pathogenic and normal flora therefore rendering the food germ free and fit for human consumption. There is a little decrease in protein level in the mild consumers (Group B), and chronic consumers (group C) compared with their corresponding control (Group A) and subjects in complan Milk (Group D) through all the results are within the normal ranges (Table 3). The resultant decrease could be attributed to the fact that there is found a substantial decrease in protein quality of drum-dried common maize-ogi (Wikipedia, 2013) which can be ascribed to the drying process.

There is significant increase in haemoglobin level, packed cell volume (%), white blood cell total count (mm^3) and platelet counts compared to their corresponding control. The increase could be advantageous to toddlers to keep them from being anaemic. Zea mays may contain a principle element that can assist erythropoietic systems in the body. Zea mays contains carbohydrate, sugar, water and fibers as mentioned earlier in its chemical contents. Carbohydrate derived by consumers of for Zea mays gives energy. Carbohydrates are simple molecules that are broken down by digestion by addition of water into simple sugars. This is as a result of enzymes.

Calcium and glucose levels were within the normal levels (Table 3) throughout the research study. This could be linked with proper metabolism of sugar in the body of subjects to produce energy. Calcium ions are involved in bone formation and in coagulation mechanism in the body. It could be deduced from this research study that Zea mays can be used as a substitute for complan milk (Industrial Nutritious food) in feeding children as it does virtually the same thing complan milk does in children.

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