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Comparative Study of Nutritive Properties and Some Toxic Minerals in Locally Prepared Wheat (*Triticum Aestivum*) and Plantain Flours (*Musa Paradisiacal*) Consumed in Ekiti State

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Abstract: Comparative evaluation of some nutritive properties and minerals was carried out on locally prepared wheat and plantain flours. The proximate analysis shows that highest percentage in the moisture content; crude fat, crude fibre and crude protein contents were recorded in wheat flour as 12.20, 1.94, 2.03 and 11.96 all in percentage respectively. Highest values for ash and carbohydrate content were observed in plantain flour as 2.92% and 83.70% respectively. The mineral analysis shows that highest level (mg/kg) of zinc (39.5), Cadmium (0.20) and lead (0.22) were observed in wheat, while highest level of copper (3.51) was recorded in plantain flour. Cadmium and lead values were less than the detection limit in the plantain flour.

Keywords: Comparative study; Plantain; Wheat; Minerals; Toxic.

1. Introduction

Wheat (*Triticum aestivum*) belongs to the 'poaceae' family and classified into sub-family 'poideae'. It has been a stable food for humans for thousands of years whole grain (wheat). According to recent research provide benefits relating to the many individual nutrients and bioactive compounds, also called phytochemicals [1]. Whole wheat grain is made up of three distinct sections; outer fibre-rich bran, the micro nutrients-rich germ, the starchy main body of the kernel known as the endosperm. The bran contains fibre, minerals such as iron, zinc copper and magnesium, vitamin E, B vitamins and a multitude of bioactive compounds. Bioactive compounds such as flavonoids and carotenoids have a beneficial biological action in the body, and emerging research suggest that they may, together with fibre be responsible for many of the health effects of the whole grains [2]. The germ is the embryo which will sprout into a new plant under favourable conditions. It contains essential unsaturated fats, B Vitamins, vitamin E, selenium, antioxidants, plant sterol and other bioactive compounds. The endosperm is the germ's initial food supply providing essential energy. It is the largest portion of the kernel and contains largely starchy carbohydrate, some proteins and small amount of fibre, vitamins and minerals. Plantain (*Musa paradisiacal*) are vital crops for many tropical countries as they are one of the cheapest sources of starch which can be provided. Over 2.11 million metric tons of plantains are produced in Nigeria annually which contributes substantially to the nutritional of subtropical local population [3]. In Africa, the vast majority of growers produce plantain for their own personal consumption and it is an integral part of the diet of millions of people [4]. *Musa paradisiacal* is a major starchy staple in the sub-Saharan Africa both for rural and urban populace providing more than 25% of carbohydrate and 10% of daily calories intake for more than 70 million people in the continent [5]. The bunch may be consumed when the fruit is completely green or fully ripened. The green bunch may also be peeled, dried and then blended, the flour is also obtained for consumption. The increasing rate of population growth coupled with the dwindling sources and availability of some imported food products and as well the effect of economic crisis calls for an in-depth research into unripened plantain and whole grain (wheat) flours commonly consumed by Ekiti people recently reported to be their major sources of nutrients, vital for human health. Proximate composition comprises of nitrogen (as an index of crude protein), water, fat, ash and crude fibre when the total is subtracted from 100% the difference is termed carbohydrate by difference. Minerals can be divided into three groups mainly major elements (Na, Ca and K etc), trace elements (Zn and Cu) and ultratrace elements (Cd and Pb).

2. Materials and Methods

2.1. Sample Preparation

Wheat flour-wheat grains were purchased ,cleaned by removing unwanted materials like logs and dirt and later ground using pestle and mortar in order to obtain a fine powdery grain.(wheat flour).Plantain flour-freshly harvested unripened plantain were purchased from the local market in Ado-Ekiti, Southwest Nigeria, are dried for about two weeks and ground with pestle and mortar.

3. Proximate Analysis

The proximate analysis (moisture,ash,crude fat,crude fibre,crude protein and carbohydrate) contents were determined using the procedure described by Association of Official Analytical Chemists [6].The moisture content in each of the sample was determined by weighing 3g of each sample into a pre-weighed aluminium dry dish,the samples were dried to a constant weight in the moisture analyzer at 105°C for about 45minutes and then the moisture was read and recorded. The ash content was determined for all the samples by the incineration of the samples placed in a muffle furnace maintained at 550°C for 5-8 hours while the crude fibre obtained by digesting 2g of the samples with H₂SO₄ and NaOH and incineration the residue in the muffle furnace maintain at 550°C for 5-8hours.The percentage total nitrogen times 2.25 was determined by kjeldahl method,using 2g of each sample.The crude lipid content was also determined by exhaustively extracting 10g of each sample in a soxhlet apparatus using n-hexane as the extracting solvent and the carbohydrate content was determined by deducting the total percentage of moisture,ash,fibre,fat and protein from 100.

4. Mineral Analysis

The mineral analysis was carried out using standard methods as described by Pearson [7].The samples were dry ashing at 550°C to constant weight and dissolved the ash in volumetric flasks with de-ionized water with a few drops of concentrated HCL.The sample solutions were stored for mineral analysis using Atomic Absorption Spectrophotometer [6].

5. Results

The proximate composition of the samples is shown in table 1.

Table-1. proximate analysis of the samples

S/N	Mineral(Mg/Kg)	Wheat Flour	Plantain Flour
1	Zn	39.5	6.8
2	Cu	3.40	3.51
3	Cd	0.20	LTDL
4	Pb	0.22	LTDL

LTDL (Less than detection limit)

6. Discussion

In the studies,the proximate parameters (moisture, ash, crude fat, crude fibre, crude protein and carbohydrate contents) was determined using an AND-NF-50 moisture analyser at 105°C.

The result of the proximate composition in wheat and plantain flours given in table 1 shows that the percentage proximate composition were as follows; the highest moisture, crude fat, crude fibre and crude protein contents were recorded in wheat flour as 12.20,1.94,2.03 and 11.96 all in percentage respectively. Highest values for ash and carbohydrate contents were recorded in plantain flour as 2.925% and 83.70% respectively. Moisture content determination is very important in the sense that it determines the way the food will be processed and its shelf-life [3]. It is also used as a measure of stability and susceptibility to microbial activities and contamination. Food that is averagely in protein help in improving blood glucose control.

7. Minerals Analysis

The result of concentration of the essential trace elements (Zn and Cu) and ultra trace elements (Cd and Pb) in wheat and plantain flours given in table 2 shows that the metal concentration were within the following range: Zn (6.81-39.5),Cu (3.40-3.51),Cd (LTDL-0.20),Pb (LTDL-0.22) all in mg/kg. Highest level (mg/kg) of zinc (39.5) Cadmium (0.20) and Lead (0.22) were observed in wheat flour. While highest level of copper (3.51) was recorded in plantain flour.

8. Conclusion and Recommendation

Wheat flour was high in protein and crude fibre contents than plantain flour. High level of protein and crude fibre recorded wheat could help in control of blood glucose and decrease the risk of colon cancer respectively. Zinc and copper were identified in both wheat and plantain flour while toxic cadmium and lead were found in wheat flour alone. High concentration of trace metals (Zn and Cu) which are essential for human health was recorded in wheat

than that of plantain flour. Both plantain and wheat flour were relatively safe in terms of trace and ultra trace metal contamination since all (Zn,Cu,Cd and Pb) levels were within the safe limit of 90,40,20 and 30 all in mg/kg as set by FAO/WHO, 2001.

Recommendation

Base on the findings of this research, it could be recommended that wheat flour could be consume regularly than plantain flour in the human diet, since wheat contains, moderately high level of protein, crude fibre and essential zinc than plantain flour which could help in reducing risk of some serious ailment like colon cancer, and cardiovascular diseases.

Also the locally prepared wheat flour should be stored in a tight container for short period of time because of its high moisture content which may likely make it to be highly susceptible to micro-organism activities and reduce its shelf-life.

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