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## The effect of potassium bromate on the vitamin a and iron contents of wheat flour and dough

C.S.Okafor<sup>1\*</sup>, F.C.Ezeonu<sup>1</sup>, S.O.Ogbodo<sup>2</sup>

<sup>1</sup>Dept. of Applied Biochemistry, Nnamdi Azikiwe University, Awka, (NIGERIA)

<sup>2</sup>Dept of Med. Lab. Sciences, College of Health Science, Ebonyi State University, Abakaliki, (NIGERIA)

E-mail : [chikeoka@yahoo.com](mailto:chikeoka@yahoo.com)

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### ABSTRACT

This Study investigated the effect of potassium bromate on the nutritional value of wheat flour preserved with potassium bromate. Superb bakers choice wheat flour was used for the study. The wheat was divided into five equal portions thoroughly mixed with varying doses (0mg, 50mg, 100mg, 200mg and 300mg/kg flour) of potassium bromate respectively. Samples were wrapped in black polythene bags to protect them from light and stored for 4 weeks while the nutrient values of the different rations and dough made from them were determined at the onset and then at the end of the study which was four (4) weeks. Results of the study showed that potassium bromate significantly ( $p < 0.05$ ) reduced the vitamin A content of the treated flour and dough while it significantly ( $p < 0.05$ ) reduced the iron level of the treated dough only. The results of the study showed that potassium bromate deteriorates the nutritional value of both flour and dough.

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### KEYWORDS

Vitamin A;  
Iron;  
Potassium bromate;  
Wheat flour;  
Dough.

### INTRODUCTION

Food additives are any substance including any source of radiation, the use of which results or may reasonably be expected to result in that substance or its byproducts becoming a part of or affecting the characteristics of a food<sup>[1]</sup>. Food additives when used in proper amounts may still pose a health hazard for specific small but vulnerable groups in the population<sup>[2]</sup>.

Potassium bromate is a food additive classified as an improver<sup>[3]</sup>. It is an oxidizing agent that is utilized in flour primarily for dough improvement. Under the right proportion, which is 60mg/kg, potassium bromate will

prevent the attack of the flour by weevils, microbial agents and mites and so it can act as preservative<sup>[3]</sup>. It is a food additive used to improve the preservative qualities, flavor, colour, texture, appearance and stability of food most especially flour and dough<sup>[4]</sup>. Most flour milling companies add bromate to their products to improve the quality of flour produced<sup>[5]</sup>. Despite a ban on potassium bromate in flour by the World Health Organization, some nations are allowing its use as oxidizer in baked foods at very low levels<sup>[6]</sup>. It was observed that many bakeries in Nigeria are not NAFDAC compliant in terms of bromate use in bread, exposing the population to the effects of bromate<sup>[5,7,8]</sup>. Bakers associations

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maintain that potassium bromate is converted to harmless potassium bromide during the baking process<sup>[6]</sup>. The improving action does not take place until the flour is made into dough<sup>[3]</sup>.

During storage, flour increases in strength and there is a consequent improvement in the baking qualities. The addition of 'Improvers', however, produce some what similar changes in the properties of the gluten (in the dough) in a matter of hours<sup>[3]</sup>. The improvement in the baking quality of flour by potassium bromate has endeared bakers to potassium bromate, hence the resistance to desist from using it. The study carried out by<sup>[9]</sup> on the potassium bromate content of Bread and flour samples in Uyo metropolis showed the presence of potassium bromate in some of the samples. Research findings have shown that potassium bromate decomposes vitamins A, B<sub>1</sub>, B<sub>2</sub>, and E in bread<sup>[1]</sup>.

Apart from its use in flour, potassium bromate is used in permanent hair wave neutralizing solutions and the dying of textiles using sulfur dyes<sup>[10]</sup>. It may be formed in water during ozonation when the bromide ion is present<sup>[11]</sup>. Some natural foods like flour have natural content of bromine. Flour has 2.4-7.7mg/kg of bromine<sup>[9]</sup>.

### AIM AND OBJECTIVES

This study aimed at determining the effect of potassium bromate on the vitamin A and iron contents of wheat flour and dough.

### EXPERIMENTAL

#### Reagents

All reagents used were of analytical grade. The potassium bromate used was produced by BDH, England.

#### Sample collection

The wheat flour brand, Superb Bakers Choice flour used for the study was bought from flour market Ogbunike, Anambra State, Nigeria.

#### Sample treatment

One kilogramme of the flour sample, Superb bakers choice wheat flour used for the study was thoroughly mixed with a large spatula and then divided into 5 groups; group A (control), group B, group C, group

D, and group E (treatment groups). The different groups except group A were treated with the following concentrations of potassium bromate; 50mg/kg, 100mg/kg, 200mg/kg and 300mg/kg flour. All the different groups were wrapped in a black polythene bag (to prevent the micronutrients from oxidation by light) and were stored in a cool place for a total study period of 4 weeks. Vitamin A, and iron contents of the wheat flour were analyzed at the onset of the experiment before preserving with potassium bromate and then subsequently at the end of the storage period, which was 4 weeks.

Dough made from each group was similarly analyzed along at each point in time. The method of<sup>[12]</sup> was used for the dough preparation

#### Vitamin A and iron determination

Vitamin A and iron contents determinations were done using the method<sup>[3]</sup>.

## RESULTS

#### Vitamin A content

Figure 1 shows the Vitamin A content of flour and dough preserved with different doses of potassium bromate. The result shows appreciable decrease in vitamin A content of both treated flour and dough after 4 shelf life

#### Iron content

Figure 2 shows the Iron content of flour and dough preserved with different doses of potassium bromate. A sharp decrease in iron content after 4 weeks in both flour and dough.

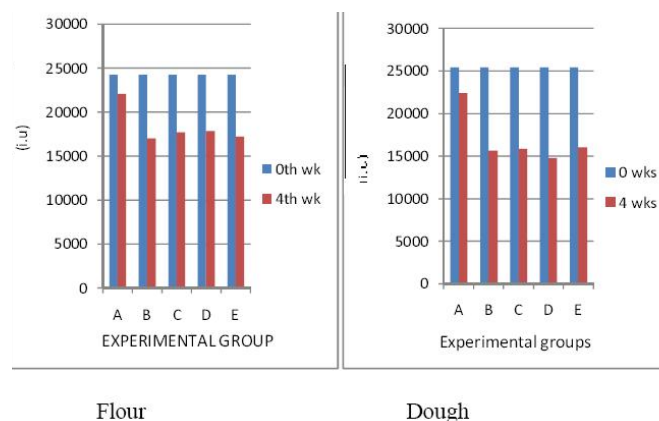
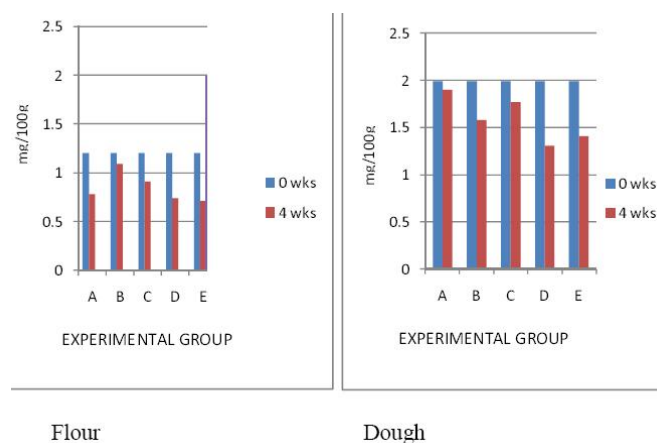


Figure 1 : Vitamin A content of flour and dough preserved with different doses of potassium bromate



**Figure 2 : Iron content of flour and dough preserved with different doses of potassium bromate**

## DISCUSSION

Vitamin A content of all the treated flour and dough was significantly decreased ( $p < 0.05$ ). This agrees with earlier report by<sup>[1]</sup> that potassium bromate decomposes vitamins A in bread. The vitamin A content of the dough was higher due to the vitamin A contributed by the oil and milk in the dough. Figure 1 shows that potassium bromate facilitates the rate of deterioration of vitamin A irrespective of dose as observed after 4 weeks of shelf life. Vitamin A stimulates and enhances many immune functions including anti-body response and activity of various white blood cells and T-helper cells<sup>[13]</sup>. Vitamin A deficiency causes the death of approximately 500,000 children each year in developing countries<sup>[14]</sup>. Marginal vitamin A status probably contributes to reduced survivability in response to respiratory and diarrhea diseases and increases mortality by about 3 to 4 times<sup>[14]</sup>. Vitamin A deficiency (VAD) is an extended public health problem, especially in Africa<sup>[15]</sup>. Preschool-age children and women of reproductive age are the two population groups most at risk. Vitamin A supplementation has been shown to decrease the incidence of measles, diarrhoeal disease and all-cause mortality, as well as to improve several aspects of eye health<sup>[16]</sup>. The consumption of flour products with reduced level of vitamin A as a result of the presence of potassium bromate can compromise the health of flour product consumers.

There was also significant reduction ( $p < 0.05$ ) in iron content of the treated dough groups. The iron content of the dough was higher due to the iron contributed by the milk and other ingredients of the dough. Potassium

bromate oxidizes iron in wheat flour<sup>[17]</sup>. Iron is involved in anti-oxidant function as a metal activator in catalase<sup>[18]</sup>. It therefore protects the body against reactive oxygen radicals<sup>[18]</sup>. The deficiency of iron results in anaemia, a condition typified by tiredness, loss of health and palpitation in which subnormal levels of haemoglobin are present in the blood. Primary iron deficiency may be high in developing countries<sup>[2]</sup>.

## ABBREVIATION

NAFDAC: National Agency For Food, Drug Administration and Control

## CONCLUSION

The results of the study showed that potassium bromate deteriorates the nutritional value of both flour and dough. Vitamin A and iron are important micronutrients that enhance good healthy. Undermining their levels in food especially flour products will impact negatively on the health of consumers of these foods. So regulatory agencies should strictly enforce the ban on the use of potassium bromate in flour and its products.

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