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The effect of potassium bromate on the packed cell volume (PCV) of wistar albino rats

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ABSTRACT

This study investigated the the effect of potassium bromate on the Packed Cell Volume (PCV) of wistar albino rats. Thirty (30) adult male Wistar albino rats weighing 155-213g used for the study were first acclimatized for one week and divided into 3 groups of 10 rats each; group A (control), group B, and group C (treatment groups). Groups B and C were fed with compounded feed rations composed of 20% grower's marsh and 80% wheat flour treated with 200mg and 300mg of potassium bromate/kg feed ration respectively. Group A (control) animals were fed with the same ration of compounded diet, but without potassium bromate. The animals were fed for 4 weeks. The result of the study showed that there was no significant difference ($p>0.05$) between the treated groups and control for PCV.

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KEYWORDS

Packed Cell Volume;
Potassium bromate;
Wheat flour;
Wistar albino rats;
Grower's marsh.

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^[1]. Food additives when used in proper amounts may still pose a health hazard for specific small but vulnerable groups in the population^[2].

Potassium bromate is a food additive classified as an improver^[3]. 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^[3]. It

is a food additive used to improve the preservative qualities, flavor, colour, texture, appearance and stability of food most especially flour and dough^[4]. Most flour milling companies add bromate to their products to improve the quality of flour produced^[5]. 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^[6]. 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^[5,7,8]. Bakers associations maintain that potassium bromate is converted to harmless potassium bromide during the baking process^[6]. The improving action does not take place until the flour is made into dough^[3].

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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^[3]. 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^[9] on the potassium bromate content of Bread and flour samples in Uyo metropolis showed the presence of potassium bromate in some of the samples. In the report of a two and half year boy who swallowed a neutralizing solution containing potassium bromate, the only haematological finding was a change in hemoglobin concentration from 11.4g/dl to 10.7g/dl in a period of two months^[10].

Apart from its use in flour, potassium bromate is used in permanent hair wave neutralizing solutions and the dyeing of textiles using sulfur dyes^[11]. It may be formed in water during ozonation when the bromide ion is present^[12]. Some natural foods like flour have natural content of bromine. Flour has 2.4-7.7mg/kg of bromine^[9].

AIM AND OBJECTIVES

This study aimed at determining the effect of potassium bromate on the Packed

Cell Volume (PCV) of wistar albino rats.

EXPERIMENTAL

Reagents

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

Sample procurement

Wistar albino rats used for the study were bought from the Department of Veterinary Medicine, University of Nigeria Nsukka, Enugu State, Nigeria.

Sample treatment

Thirty (30) adult male Wistar albino rats weighing 155-213g used for the study were first acclimatized for one week and divided into 3 groups of 10 rats each; group A (control), group B, and group C (treatment

groups). Groups B and C were fed with compounded feed rations composed of 20% grower's mash and 80% wheat flour treated with 200mg and 300mg of potassium bromate/kg feed ration respectively. Group A (control) animals were fed with the same ration of compounded diet, but without potassium bromate. Water and feed were given to the animals *ad libitum*.

Sacrifice and sample collection

At onset of the experiment and then at the end of the study, which was 4 weeks, 5 rats out of the 10 per group were sacrificed. The animals were starved overnight prior to sacrifice. Sacrifice was done using cotton wool soaked in a little chloroform which was put in a transparent plastic bucket together with the animals. The bucket was covered and the animal observed for signs of suffocation. Following suffocation blood was extracted from the animal through heart puncture using syringe and needle. The blood samples were collected in EDTA anti-coagulant tubes and subsequently used for PCV analysis using an automated haematological analyzer, Sysmex kx-21 model, Japan.

Packed Cell Volume (PCV) Determination

Automated haematological analyzer, Sysmex kx-21 model, Japan was used for the analysis. About 2ml of whole blood was fed into the analyzer and the results printed out

RESULTS

Packed cell volume (PCV)

Figure 1 shows the % Packed Cell Volume PCV. Result shows that the PCV for group A (control) was slightly higher than the treated groups: groups B (200mg/kg) and C (300mg/kg).

DISCUSSION

The result of the study showed that at the end of the study the PCV for group A (control) was 37.61 ± 5.00 while that of group B (200mg/kg) was 35.21 ± 3.29 and group C (300mg/kg) was 35.56 ± 4.06 .

No significant difference ($p > 0.05$) was observed between the treated groups and control for PCV. This is supported by (Thompson and Westfall, 1949) who

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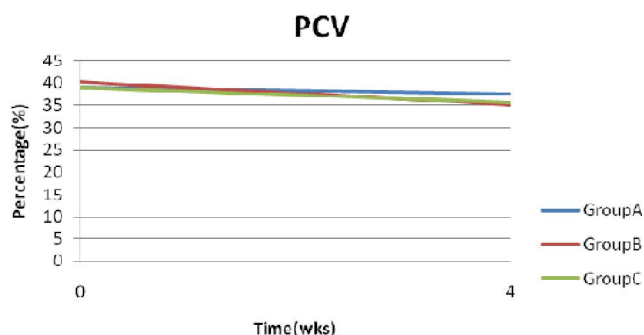


Figure 1: The packed cell volume (%) profile of the experimental wistar albino rats.

reported that in a two and half year boy who swallowed a neutralizing solution containing potassium bromate, the only haematological finding was a change in hemoglobin concentration from 11.4g/dl to 10.7g/dl in a period of two months.

ABBREVIATION

NAFDAC: National Agency For Food, Drug Administration and Control; PCV: Packed Cell Volume.

CONCLUSION

The results of the study showed that potassium bromate is unlikely to be one of the factors contributing to the incidence of anemia that the developing nations of the world mostly suffer from.

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