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LEVELS OF VITAMIN A IN SOME FORTIFIED VEGETABLE OILS AND MARGARINES SOLD IN GOMBE STATE

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ABSTRACT

This research assessed the levels of compliance with vitamin A fortification by the manufacturers of margarines and vegetable oils. This was carried out by the determination of vitamin A in the margarines and vegetable oil samples which were purchased from retail outlets in Gombe metropolis. The levels of vitamin A were determined calorimetrically at 620nm after extraction. The levels of vitamin A in the vegetable oils samples ranged between 5322 and 7900 iu/kg while the level of margarine samples ranged from 3660-6170 iu/kg and the levels in which is in line with the manufacturers intended level of fortification. However, the recommended value for Vitamin A is 20000 iu/kg. It can be concluded that the degree of compliance in vitamin A fortification in margarine and vegetable oil samples is low and more effort has to be put by authorities to ensure strict compliance by the manufacturers of these products.

Keywords: Vitamin A, Margarines, Vegetable oils, Fortification

INTRODUCTION

Micronutrient deficiencies still concern 2 to 3 billion people around the world, and one-third of the children below five years are exposed to vitamin A deficiency (Akhtar *et al.,* 2011). In the human diet, vitamin A is found in animal products as free or esterified retinol and in fruits and vegetables as provitamin A carotenoid. This fat soluble vitamin is involved in health functions such as vision, immunity, cellular differentiation, embryogenesis, and growth (Azaïs-Braesco and Grolier, 2001). Its deficiency can increase susceptibility to common infections and affect ocular health, from the development of nyctalopia to blindness (Velasco *et al.,* 2005). In less developed countries, vitamin A deficiency contributes to adult and child mortality and is thus one of the major public health problems (West, 2004).

To improve vitamin A intake, food fortification policies have been developed worldwide, and fortification with micronutrients has been identified as one of the top three international development priorities (Horton *et al.,* 2008). Flours, oils, and sugar are considered to be the best food vehicles for fortification and as well as cost-effective solutions (West and Danton, 2008; Allen *et al.,* 2006). Oils constitute a good matrix for fortification with lipophilic vitamin like vitamin A, due to ease of homogenization and stability of fortificants in liquid and oily forms.

Vitamin A deficiency (VAD) in the developing world is not restricted to preschool-aged children. It affects pregnant and lactating women and sometimes school-aged children and adolescents (West, 2004). Ideally, women of childbearing age should begin pregnancy with good vitamin A status, because it is difficult to entirely correct a deficiency with prenatal supplementation. Alternative strategies that frequently supply small but effective amounts of vitamin A

[e.g., one third of the recommended daily intake (RDI)] over a prolonged time would be helpful. A diverse diet, which include food of animal origin that are rich in preformed vitamin A (esters of retinol), might be sufficient to satisfy the daily requirements of vitamin A (Velasco Cruz, *et al.,* 2005). However, in most developing countries, diets are monotonous and mainly based on cereals and legumes that are poor sources of vitamin A. Even carotenoid rich vegetables have low vitamin A bioavailability and bioefficacy (West and Danton, 2008). Given these issues, food fortification with vitamin A can be an attractive and potentially effective and important intervention. Fortifying a widely consumed centrally processed food or condiment capitalizes on the production and distribution system of the food market to deliver low doses of vitamin A daily to a large number of people. Among the advantages of food fortification is that, it is generally acceptable and requires minimal changes in food habits, easy to sustain and usually costs 2% higher than the cost of the unfortified food, its delivery system is already in place (Allen 2006). Several publications have summarized these experiences with food fortification in the developing world

MATERIALS AND METHOD

Collection of Vegetables and Margarines

The food items were purchased from retail outlets in Gombe metropolis. These include:
Five samples of packaged margarines were designated margarine 1, 2, 3, 4 and 5 respectively.
Five different brands of packaged vegetable oilwere also designated as Oil 1, 2 3, 4 and 5 respectively.

Colorimetric Estimation of Retinol in Foods

A quantity of the sample (1g/ml) was weighed and macerated with 20ml of N-hexane in a test tube for 10 minutes. 3ml of the upper hexane extract was transferred into a dry test tube in duplicates and evaporated to dryness. 0.2ml of acetic anhydride chloroform reagent was then added and 2ml of 50% trichloroacetic acid (TCA) in chloroform was also added. The absorbance was taken at 15 seconds and 30 seconds intervals using 620nm as wavelength (Achikanu *et al.,* 2013).
A standard calibration curve was then prepared by making a stock solution of 1g/ml standard vitamin A in 20ml N-hexane. Working standards were then prepared and absorbance taken.

RESULTS AND DISCUSSION

After extraction and estimation of retinol in various vegetable oil samples, the results obtained are as presented in Figure 1.

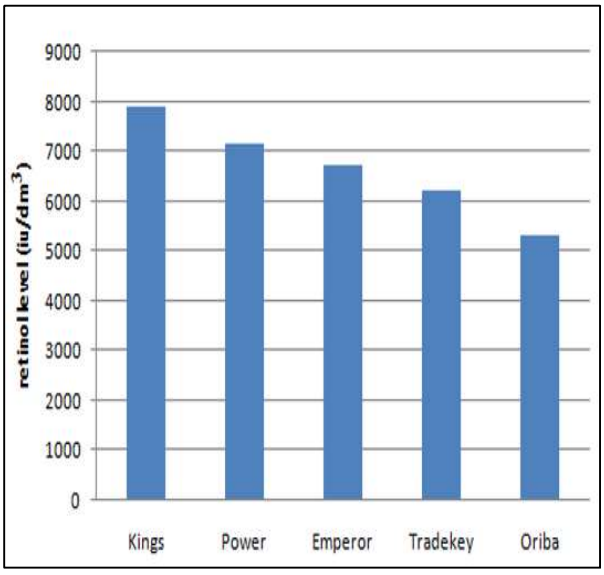

Figure1: Concentration of Retinol in Vegetable Oil Samples (IU/dm^3)

After extraction and estimation of retinol in various Margarine samples, the results obtained are as presented in Figure 2.

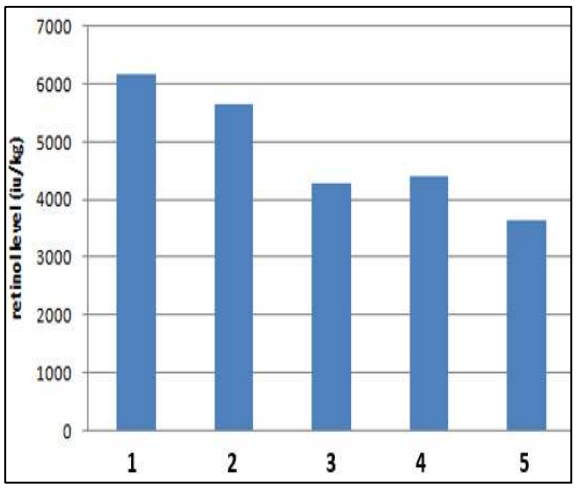

Figure 2: Concentration of Retinol in Margarines Samples (IU/Kg)

The levels of retinol determined in all the five different brand of vegetable oils and five different brand of margarines was found to be lower than the recommended level of fortification (20,000IU/Kg and 26,000-33,000 IU/Kg) (NAFDAC 2019). Vitamin A is unstable under normal storage conditions particularly in harsh environments (Laillou, 2012). The low level vitamin A obtained from the samples may be due to the exposure of the items to the air, light and heat that destabilizes the vitamin (Maigari 2012). The structure of vitamin A contains many double bonds that make it susceptible to degradation by sun light, air.

In vegetable oil samples (Figure 1), analysis within the samples showed that oil 1 contain the highest value (*7900 iu/kg*) while oil 5 has the lowest value (*5322 iu/kg*). These results indicate a very low level of compliance in their fortification.

In margarines samples (Figure 2), results obtained showed that margarine 1 has the highest value (*6170 iu/kg*) when compared to the other samples while margarine 5 has the least value (*3660 iu/kg*) within the samples analysed. This indicate a low level of compliance by the manufacturers of these products. It was reported that the National Agency for Food and Drugs Administration and Control (NAFDAC) has banned the importation of some vegetable oils and also sealed some oil mills due to poor or non-compliance in fortification of Vitamin A by the companies involved (Anon, 2007).

CONCLUSION

The National Agency for Food and Drugs Administration and Control (NAFDAC) has made a mandatory enforcement of compliance in fortification of foods with vitamin A in 2002, the results obtained from this research revealed that all the vegetable oil and margarine samples analyzed showed low level of compliance by the companies and is significantly much lower when compared to the recommended value as set by NAFDAC and Standard Organization of Nigeria (SON). It is recommended that all government agencies involved should put more effort to ensure strict compliance by the manufacturers of these products and to also investigate the methods of packaging and a label should be place on the packaged products on how best the retailers and consumers can handle fortified food by keeping them away from sunlight in other to reduce oxidation of vitamin A. Another recommendation is that people should look for other sources of vitamins A in foods since oil and margarines are not the only sources.

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