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Storage stability of iodine in some commercial iodized salt samples sold in Anambra State

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ABSTRACT

This study was carried out to investigate the storage stability of iodine in some commercial iodized salt samples marketed in Anambra state. Three different brands of iodized salt samples (Annapurna, Mr. Chef and Uncle Palm) were purchased from different major market in Anambra State, the salt samples (same brand) were thoroughly mixed and divided into two parts. One portion was kept in an open container while the other was sealed in a low density polythene bag and stored for a period of eight (8) weeks. Determination of the iodine levels of the salt samples was done using person method. Results showed that the concentrations of iodine from the sealed and exposed salt samples decreased over the storage period. The sealed iodized salt samples (ANS1, MCS1, and UPS1) lost about 10.08, 37.37 and 38.42% of their iodine contents after the eight weeks of storage while the exposed salt samples (ANS2, MCS2, and UPS2) lost up to 60.10, 63.44 and 64.99% of their iodine contents respectively. This research has shown that iodized salt may slowly loose its iodine content by exposure to the atmosphere over a long period of time.

Keywords: *Iodine, Stability, Exposure, Storage, Iodized salt.*

INTRODUCTION

Iodine is an essential trace element which is vital to the function of the thyroid gland. It is an important component of thyroid hormones which are required for normal body development and metabolism. For man to obtain maximum benefit from food, the food must contain all essential nutrients in the desired proportion (Okaka *et al*., 1992). Micronutrients like iodine are among the nutrients used in fortifying foods to combat micronutrient malnutrition in individuals and it plays important role in normal metabolism as a constituent of thyroxine and other related compound synthesized in the thyroid gland (Okaka *et al.*, 1992; Diosady *et al.*, 1997).

In all nooks and crannies of Anambra state, people are sometimes seen suffering from goiter and cretinism. It was reported that these disease are caused by the deficiency of iodine in the body. Standury and Durn (2001) stated that iodine is an essential micronutrient for both animal and human being because of its role in the structure of the thyroid hormone. Research by Wardlaw, (2003) revealed that insufficient iodine intake cause the thyroid gland to enlarge as it attempts to take up more iodine from the blood stream, this eventually leads to simple goiter. This showed that the deficiency of iodine causes decreased production of thyroxin leading to increased thyroid stimulating hormone output from the pituitary gland. This might result to an increase in the size of the thyroid gland, a situation in which the thyroid gland enlarge to a clinically visible level (Okoye and Eboatu, 2007, Okafor, 2008).

The food supply of more than 1.6 billion people is lacking in adequate levels of iodine resulting in the widespread prevalence of a spectrum of iodine deficiency disorder (IDD) and the regular delivery of small doses of iodine to large populations through salt is beginning to have a dramatic effect (WHO, 1993). Sackbein and Lehman, (1985) reported that in industrialized countries, most animal feeds are enriched with iodine. Sources of iodine

include among others, fish, sea vegetables (sea weeds), sea water, natural brines and iodized salt. Iodized salt, according to Anderson, (1996) is probably the most reliable source of iodine. Salt that is iodized may slowly lose its iodine content by exposure to the atmospheric conditions over a long period of time. This study was carried out to assess the storage stability of iodine in some commercial iodized salt samples sold in Anambra State.

MATERIALS AND METHODS

Three different brands of iodized salt samples (small packs) were purchased from major markets in Anambra State. The iodized small pack salt samples are Annapurna (ANS), Mr. Chef (MSC) and uncle palm (UPS) respectively. The salt samples (same brand) were thoroughly mixed and divided into two equal parts. One portion was stored in an open plastic container while the other was sealed in a low density polythene bag. Concentrations of iodine in the different salt samples were determined the first day of purchase of the salt before storage. Analysis of the iodine contents of the stored samples was subsequently carried out at two weeks intervals for a period of eight weeks (two months) to ascertain the rate of iodine loss from the two portions following storage. Determination of the iodine concentration of the different iodized salt samples (small packs) was done using Pearson (1976) method.

RESULTS AND DISCUSSION

The result of the mean concentrations of iodine (PPM) in the different brands of iodized salt samples during storage for a period of eight weeks is presented in Table 1.

Table 1
Concentrations of iodine (PPM) in the different iodized salt samples during storage

	Iodized salt samples and their iodine levels (ppm)					
Storage Period	**ANS_1**	**ANS_2**	**MCS_1**	**MS_2**	**UPS_1**	**UPS_2**
Day 1	67.15± 0.11	67.00± 0.01	65.11± 0.01	65.10± 0.01	64.03± 0.10	64.01± 0.10
2 weeks	65.51± 0.05	61.77± 0.58	62.02± 0.11	60.01± 0.10	63.71± 0.15	60.31± 0.05
4 weeks	65.60± 1.01	56.75± 0.05	58.03± 0.15	50.00± 0.01	58.00± 0.15	53.74± 0.31
6 weeks	63.30± 0.10	38.07± 0.15	46.91± 0.11	36.75± 0.10	45.03± 0.12	32.81± 0.06
8 weeks	60.38 ± 0.13	26.73± 1.03	40.81± 0.60	23.80± 0.11	39.43± 0.06	22.35± 0.16

Values are means of triplicate readings + standard deviation.
ANS1, MCS1 and UPS1 are sealed iodized salt samples of Annapurna, Mr. Chef and Uncle Palm while ANS2, MCS2 and UPS2 are the exposed iodized salt samples respectively.

The concentrations of iodine (PPM) in the iodized salt samples (sealed and exposed) during eight weeks of storage were presented in Table 1. From the Table, it was observed that the levels of iodine form both the sealed and exposed salt samples decreased over the storage period of eight weeks, though the decrease in iodine levels was higher in the exposed iodized salt samples than the sealed salt samples. For instance, while the sealed (unexposed) iodized salt samples (ANS_1, MCS_1, and UPS_1) lost about 10.08, 37.37 and 38.42% of their iodine contents from the initial values of 67.15±0.10, 65.11±0.01 and 64.03±0.10 to 60.38 ± 0.13, 40.81 ± 0.60 and 39.43 ± 0.06 after eight weeks of storage, the exposed salt samples (ANS_2, MCS_2, and UPS_2) lost up to 60.10, 63.44 and 64% of their iodine contents from an initial values of 67.00 ± 0.10.65.10 ± 0.01 and 64.01 ± 0.10 to 26.73 ± 1.03, 23.80 ± 0.11 and 22.35 ± 0.16 respectively.

The difference in the rate of loss of iodine from the iodized salt samples could be as a result of the different conditions under which they were stored and displayed. The ingress of moisture into the salt samples especially the exposed container encouraged caking and loss of iodine in iodized salt (Pearson, 1996). The result also revealed that well packaged iodized salt can retain a substantial amount of its iodine over a two months storage period. This showed that iodized salt may slowly lose its iodine content by exposure to excess air over a long period of time. Wadlaw, (2003) reported that insufficient iodine intake cause the thyroid gland to enlarge as it attempts to take up more iodine from the blood stream, this eventually leads to simple goiter. A research by Stanbury and Dunn, (2001) showed that iodine is an essential micronutrient for animal and human beings because of its role in the structure of the thyroid hormone. From the findings of this research, it was observed that the iodine contents of the iodized salt samples will remain relatively constant if the salt is packaged dry in a container with an impervious lining and kept dry, cool and away from light.

CONCLUSION AND RECOMMENDATION

Iodine is an essential component of the thyroid hormones which plays a vital role in normal body metabolism. The stability of iodine in iodized salt is determined by the moisture content of the salt, the humidity of the atmosphere, light, impurities in the salt, alkalinity or acidity. Iodine is added to salt to prevent iodine deficiency disorders (IDD) which affects over 2 billion people around the world and is the leading cause of mental retardation. This research has shown that exposed salt samples lost more than 60% of their iodine contents during the eight (8) weeks storage period while the sealed iodized salt samples lost less than 30% of their iodine contents.

It was recommended that both the sellers and consumers of iodized salt should desist from exposing these salts to the environmental conditions such as moisture, light and humidity as these could lead to caking and loss of the iodine content of the salt. Small packs of iodized salts should be used by consumers as the chance of iodine loss from the big packs over a long period is more.

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