

Control Of Iodization Salt Consumed In The Region Of Sidi Bel Abbes (West Of Algeria)

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ABSTRACT

Iodine is an essential component of thyroid hormones and represent as regulator thyroid gland functions. In 1990, the World Health Organization has recommended universal salt iodization as a strategy to prevent and control disorders in iodine deficiency. Algeria is a country that has adhered to this strategy. **Goal** : Check the iodization of food salt consumed in the region of Sidi Bel Abbes (West of Algeria). **Method** : Our survey was conducted on a random sampling of 140 households to determine the iodine content of food salt by the titrimetric method. **Result** : The dosage of iodine in table salt, used by households showed an iodine content complies with the Algerian standards for 122 samples is 87.15% and substandard for 18 samples is 12.85%. **Conclusion**: According to this study, it was concluded that the marketing of non-compliant with standards Algerian salt on the market. Note, however, that the consumption of non-iodized salt only aggravates disorders due to iodine deficiency. It is essential to consider universal control strategies iodized salt.

KEYWORDS: Iodine deficiency, Iodine, Food salt, Standards.

INTRODUCTION

Iodine is an essential element in the synthesis of thyroid hormones which have a very high biological activity in the body, they play many effects on carbohydrate metabolism, protein and lipid. All body tissues are sensitive to the action of these hormones [6]. Iodine is brought to the body through diet. The sources of iodine are water, salt and various food of plant and animal origin, of marine origin are the richest in this trace element, and can also be of endogenous origin by deiodination tissue of thyroid hormones [10]. The physiological needs of iodine necessary to ensure the thyroid metabolic equilibrium are made from control populations with no deficiency of stigma. They vary according to age, gender, pregnancy or breastfeeding, of a possible prematurity [3,5].

according to the WHO, Iodine deficiency is a public health problem in 130 countries of the 191 countries worldwide surveyed, the most affected regions are Africa and Southeast Asia (WHO / ICCIDD / UNICEF, 1999). Numerous epidemiological studies have confirmed the close correlation between the incidence of goitre and severity of iodine deficiency. WHO has recommended it a few decades, iodine supplementation programs mainly by salt iodization of food at the global level to the fight against disorders caused by iodine deficiency, the iodization technique is easy to implement [4]. In Algeria, the iodization of salt is made mandatory national strategy in the last Executive Order No. 90-40 of 30 January 1990 according to a survey in schools in the town

of Sidi Hammadouche, Sidi Bel Abbes region, the goitre prevalence is estimated at 31.48% which helped to classify the area as endemic goiter [2].

We wanted, through this work, to draw the attention of the population on the quality of iodized salt available in the consumer basket, and through quality control of 140 samples of salt.

MATERIAL AND METHOD

Goal:

The aim of our work is to assess the iodine content of food salt consumed by households in the region of Sidi Bel Abbes (West of Algeria).

Sampling:

We have sampling 140 households where we have collected quantities of table salt to iodine assay.

Determination of iodine in the salt by titrimetry:

It is performed in laboratory biotoxicologie University djillali liabes Sidi Bel Abbes by the titration method.

Principle of the assay:

1- By the addition of an acid and of potassium iodide (KI), potassium iodate (KIO₃) contained in the salt is reduced to molecular iodine (I₂). This amount of iodine I₂ equivalent to the amount of iodate in the medium (salt).

2- The released iodine is titrated with sodium thiosulfate (Na₂S₂O₃)

The starch is used as the end of the titration indicator.

The iodine content in salt is classified according to the limits set by the Algerian legislation in the Executive Decree No. 90-40 of 30 January 1990.

Results:

Distribution of salt samples depending on the brand and origin:

The 140 samples analyzed salts come from the region of Sidi Bel Abbes and Sidi Hamadouche were classified by brand. We found 19 different brands.

salt brands and provenance are represented in the following table:

Table 1: Brands of salts and analyzed their origin.

The brand	Origin	Number of samples	Conditioning	Sector (private or public)
Chams	Enasel-Relizane	73	1kg bag	Public
Chemi	Enasel-Constantine	16	1kg bag	Public
Chatti	Guemar-El Oued	2	1kg bag	Private
Safi	El Oued	1	1kg bag	Private
Dounia	Still-El Oued	4	1kg bag	Private
Dauphin	Bordj el kifan-Alger	7	1kg bottle	Private
Tournado	Alger	5	1kg bag	Private
Kouisel	El Bouni-Annaba	16	1kg bag	Private
Crikosel	Still El Oued	1	1kg bag	Private
El Amir	Oran	1	1kg bag	Private
Thika	Constantine	1	1kg bag	Private
El Walima	Ain Elbeida Oran	1	1kg bag	Private
Salado	El-Hamraia El Oued	3	1kg bag	Private
Warda	Sig-Mascara	2	1kg bag	Private
El Tadj	Oran	2	1kg bag	Private
Al Ousra	Oran	1	1kg bag	Private
El Manar	El Oued	1	1kg bag	Private
Golde sel	El Oued	1	1kg bag	Private
Ras El Kheima	Messerghine-Oran	2	1kg bag	Private

- Regarding the type of packaging, it was found that samples analyzed the 140 salts are packaged in a bag of 1Kg.

- For brands, we noticed that the majority of samples (73) is 52.14% of the total sample were from the Cham brand. This is a product for the national ENASEL of salt.

Chemi the brand is represented by 16 samples is 11.42% of the total sample. It comes from the same company that covers more than half of market needs.

Kouisel the brand is represented by the same percentage of sample than Chemsî while other brands are represented by a number between 1-7 samples a percentage between 0.71% and 5% of the total sample (Figure 1).

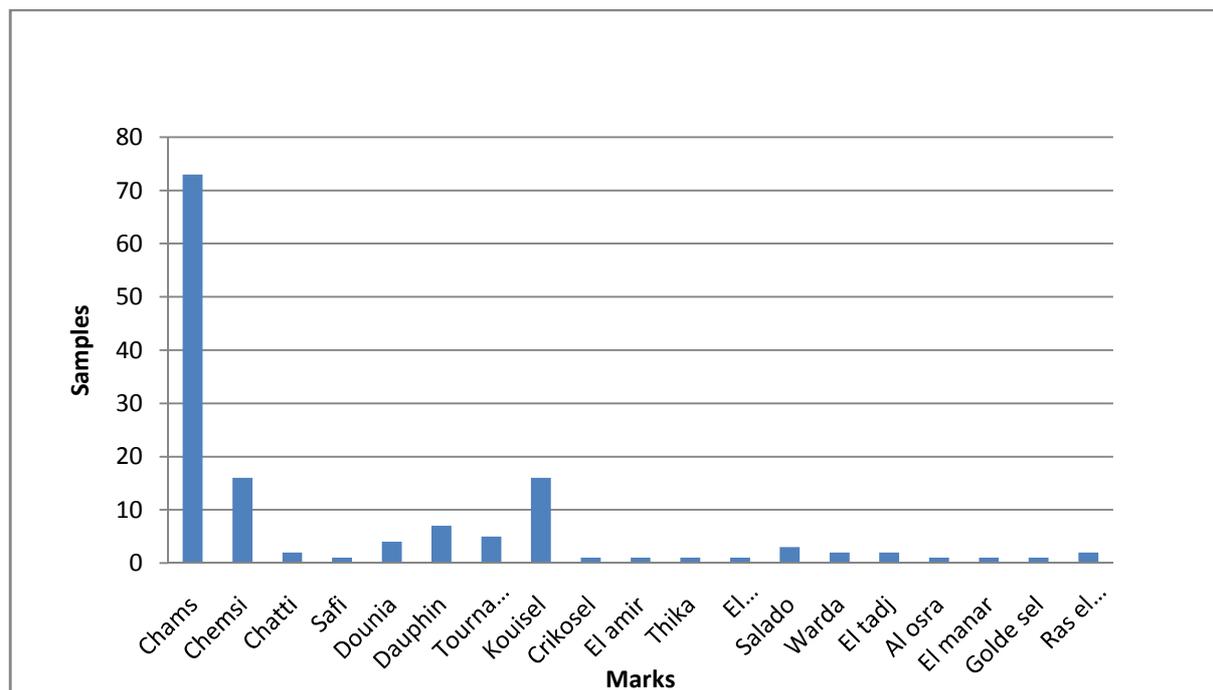


Fig. 1: Distribution of samples of salt depending on the brand.

Distribution of salt samples according to the state or private sector indicate that the 140 analyzed edible salt samples, 89 proviens the public sector (the national company ENASEL salt) is 63.57% of the total sample while 51 sample proviens private sector is 36.43% (Table 2).

Table 2: Distribution of samples of salt according to the state or private sector.

Secteur	Samples number	Percentage
Public	89	63,57%
Private	51	36,43%

Distribution of samples according to the conformity of the iodine content of salt to Algerian standards:

We compared the results of the iodine content of edible salt of the total sample to Algerian standards. This standard is established by the Algerian legislation mandating the sale of iodized salt for the prevention of disorders due to iodine deficiency (IDD).

According to Executive Order No. 90-40 of 30 January 1990 the amount of iodine and potassium iodate in salt should be to:

- Iodine (40 mg / kg): 30 mg / kg <40 mg / kg <50 mg / kg.
- Potassium iodate (67.40 mg / kg): 50,55 mg / kg <67,40 mg / kg <84.25 mg / kg.

according to standards set by the Algerian legislation, it was noted that:

- 122 samples is 87.15% are compliant.
- While 18 samples is 12.85% do not meet that possess iodine content is low or greater relative to standards (Figure 2).

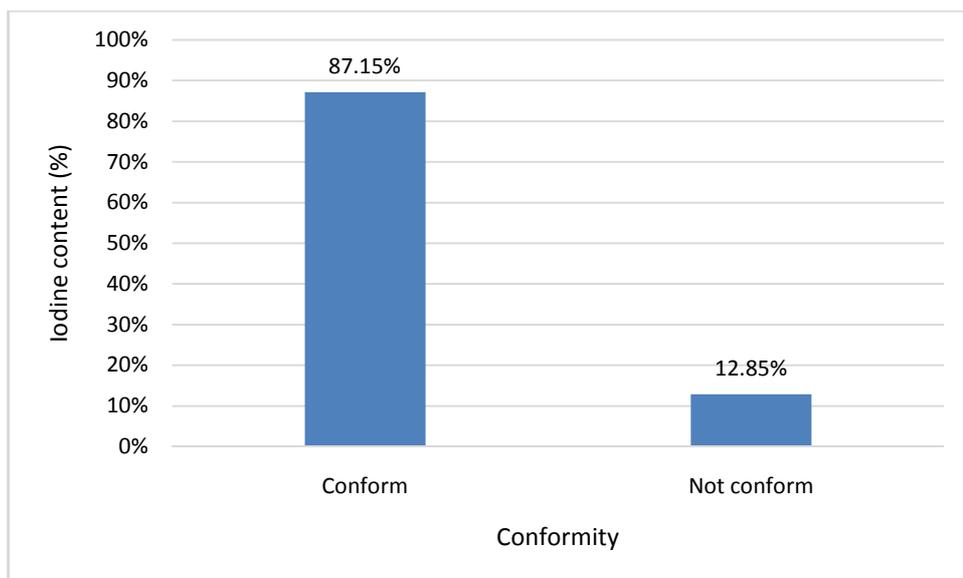


Fig. 2: Sample Distribution by the conformity of the iodine content of salt according to Algerian standards.

Rankings samples According to the conformity of the iodine content of salt to Algerian standards groups:

The results of our assays are classified into three groups:

Group 01 (moderate content in iodine): includes samples that comply with standards that represent 122 samples is 87.15% of the total sample.

Group 02 (high iodine content) includes samples that contains a higher amount of iodine standards samples that represent 7.5% of the total sample.

Group 03 (low iodine content) includes samples that contain a lower amount of iodine to standards, either a small amount or contains no trace of iodine representing 11 samples is 7.85% of the total sample (Figure 3).

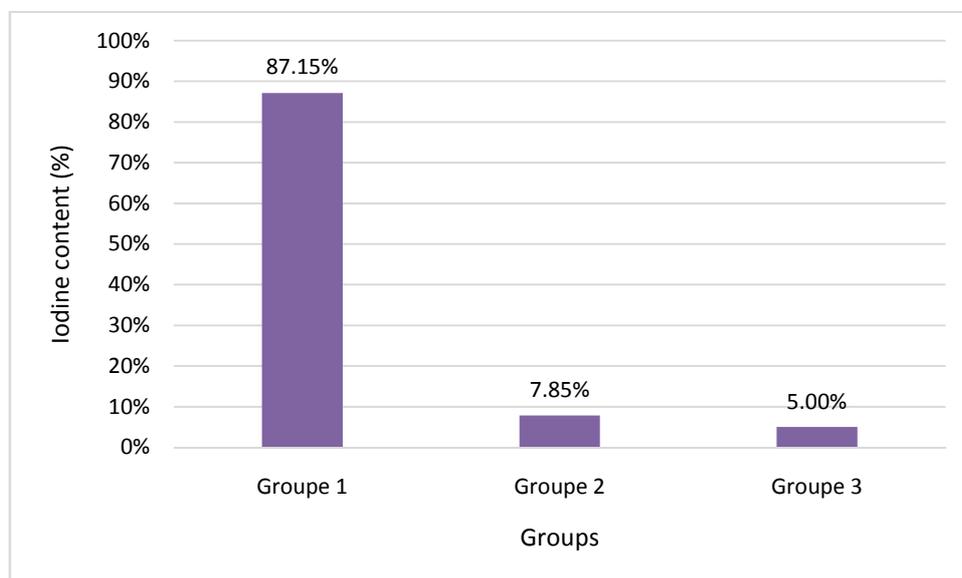


Fig. 3: Ranking of the sample groups Depending on the conformity of iodine content of salt to Algerian standards.

Discussion:

Our study focused on a sample of households ($n = 140$) in the region of Sidi Bel Abbes where we were collected amount of dietary salt for the determination of iodine, iodine and potassium iodate in 18 samples is 12.85% of the 140 is not compliant despite the package that contains the mention of iodized table salt of a higher quality, it may be due to fraud producers or bad storage conditions which greatly affect the iodine content in salt.

According to the national survey of the decade end of 2000, the prevalence of adequately iodized salt consumption was $68.5 \pm 1.3\%$ but there was a decrease in consumption of iodized salt in comparison with 1995 where the consumption of iodized salt was 92%, a decrease of 23 points in five years (EDG Algeria, 2000).

In the fight against disorders due to iodine deficiency, iodized salt is the most satisfactory approach (WHO / UNICEF / ICCIDD 1994). Salt is the ideal vehicle for iodine because it is an essential nutrient and it can provide a steady daily intake of iodine at low cost.

Several studies have been conducted worldwide to assess the iodine content of edible salt were shown the concordant results of our study:

* A study in Morocco shows that only 26.2% of households used iodized salt with availability still widespread non-iodized table salt on the market.

* Another study in Abidjan (Ivory Coast), by Adou *et al.*, In 2002, a workforce of 400 households showed that the iodine content of salt was below the minimum recommended threshold (30 ppm) 23% of households.

* In a research concerned the determination of the iodine content of salt in Mali in 2007. They conducted 810 tests salts including: 140 were in accordance with a rate of 17.28%, 670 were not in accordance with a rate of 82.72%, of which 88 had levels below 30 mg / kg (10.86%) and 582 had levels above 50mg / kg (71.85%). This study highlighted the non application of good technical iodization [8].

* The study used Nielsen (NielsenScanTrack) sales data from 2009 to identify salt products sold in the United States and determine the proportion of iodized and non-iodized salt at the retail level. The authors identified 1117 salt products. Salt blends (701 of 1117 products), such as garlic salt or similar, comprised 16% of the total sales volume. Of the remaining 416 salt products, 57 were iodized, according to the information on the label. When weighted by sales volume (in ounces or by each unit sold), only 53% of table salt sold (excluding salt blends) was iodized. Of the 47% of non-iodized salt, about 68% was regular salt, 19% kosher salt, and 12% sea salt [11].

* In India, the household coverage with iodized salt was 92%, and 78% with adequately iodized salt (≥ 15 ppm). Only 14% of households were still consuming inadequately iodized salt (iodized at 5–14.9 ppm), and 8% were using salt with no detectable amounts of iodine (< 5 ppm) [9].

Thus in the absence of a true salt of quality control; the problems of iodine intake will remain and the consequences are severe for human health. Therefore it would be necessary to consider universal control strategies iodized salt and therefore limit the disturbances caused its deficiency.

Conclusion:

The survey we conducted among a random sample of 140 households in the region of Sidi Bel Abbes (west Algeria) showed that dietary salt iodine content is satisfactory for 87.15% of the total sample and not in accordance Algerian standards for 12.85% of the samples which are 7.85% lower standards and 5% higher than the standards.

Long epidemiological research should begin to monitor iodine intake in the population.

However, it would be necessary to consider permanent awareness campaigns on conservation of iodized salt and universal control strategies iodized salt.

We urge our iodized table salt producers - especially the private sector - to adequate and homogene the spraying of iodine in the salt factory, package it in sealed packages, more glass or plastic, intended directly for domestic consumption.

Finally, it is particularly important to conduct periodic urinary iodine surveys among a representative sample of the population to monitor the actual iodine intakes.

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