

ORIGINAL ARTICLE

# Iodine Concentration in Iodized Salts Marketed in Lorestan Province, West of Iran

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## KEYWORDS

Iodine;  
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**ABSTRACT:** Iodine as a trace micronutrient has important role in body physiology and its sufficient intake is essential for synthesize and secrete adequate amounts of thyroid gland hormones which influenced all periods of human life including fetal, childhood and adolescence. The aim of this study was to evaluate iodine concentration in marketed edible salt samples in Lorestan Province, comparing with existing standards and offering solutions necessary to fix the probably problems. Two hundred and forty samples of 20 brands of marketed edible salt were purchased randomly of eight cities in Lorestan Province during April 2014 to March 2015. Iodine concentration was measured by titration method. Results showed that iodine concentration in 64.59% of salt samples was in acceptable limits according national standard of Iran during this study. A significant number of nonstandard samples showed violation of salt factories of regulations and their noncompliance to mandatory standards. Due to importance of iodine in human health and valuable role in the vital functions of the body at different periods of human life and to avoid violations of iodized salts manufacturers, regular control of marketed salts and enforcement of laws and regulations are recommended.

aflatoxin production in treated nuts.

## INTRODUCTION

Iodine deficiency is one of the four main causes of nutritional disorders and the largest preventable cause of mental and physical retardation [1]. Iodine as a trace micronutrient has important role in body physiology and its sufficient intake is essential for

synthesize and secrete adequate amounts of thyroid gland hormones. Despite large fluctuations in the level of iodine intake, thyroid hormones secretion is relatively constant. However, continuing its low intake for long time leads to insufficient production of

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thyroid hormones resulting disorders of iodine deficiency [2-4]. Iodine deficiency disorders threaten the health of more than 800 million people worldwide, including Iran. It is estimated that 20 million people are at risk of mild to severe iodine deficiency in Iran [5-6].

After formation of the national committee of iodine deficiency disorders (IDD) in 1989 in Iran, preparing and distribution of iodized salt performed as the main way to combat IDD [7]. According to National Research Council of Iran (NRC Iran), daily intake for pregnant and breast feeding is 220 and 290  $\mu\text{g}/\text{d}$ , respectively, and 150  $\mu\text{g}/\text{d}$  for adults, while for growing children, especially girls may be more than the recommended daily intake (1  $\mu\text{g}/\text{kg}/\text{bw}$ ) [8]. Minimum daily iodine requirement for a person is 100  $\mu\text{g}/\text{d}$ . Daily intake may be lower than 50  $\mu\text{g}/\text{day}$  in regions with high rate goiter and iodine deficiency [9]. Countries number where iodine deficiency was a public health problem reduced to 54 at 2003 and 47 at 2007 of 126 countries at 1993, after launching of the iodine addition to salt program [10].

Iodine deficiency is still a public health problem in 47 countries and about 2 billion people of the world are at risk. Only 49 countries have achieved to the adequacy of salt iodization [11]. Numbers of at risk people to iodine deficiency are over a billion in the world, of which 710 million are in Asia and 227, 60 and 30 million in Africa, Latin America and Europe, respectively. At least 200 to 300 million people are faced with this problem suffering from goiter disorder or one of the visible effects of iodine deficiency. For example, at least six million people suffer of cretinism [12].

Various methods provided for recovering iodine deficiency. Salt iodizing is the best, oldest, most economical method and main objectives of the IDD National Committee, which although it seems simple and practical but its implementation is accompanied by some problems [13]. Evaluation of iodine concentration in edible salt is most important section of IDD elimination program in Iran [13]. Main

purpose of monitoring is to ensure the right concentration of iodine in edible salts, purity and other features of iodized salts and program implementation in salt plants [12]. Seventeen countries have chosen salt iodizing as a solution to combat iodine deficiency disorders [14]. Given the importance of continuous measurement of iodine concentration in salt, the aim of this study was evaluating Iodine concentration in marketed edible salt samples in Lorestan Province, comparing with existing standards and offering solutions necessary to fix the probably problems.

## MATERIALS AND METHODS

### *Sampling*

Two hundred and forty samples of 20 brands of marketed edible salt were purchased randomly of eight cities in Lorestan Province including Khorramabad, Doroud, Poldokhtar, Borujerd, Alishahr, Aligudarz, Kuhdasht and Nourabad during the April 2014 to March 2015. All samples were sent to Food Control Laboratory and iodine concentration was evaluated triplicate [15].

### *Measurement of iodine in iodized salt*

Fifty gram of sample was dissolved in distilled water in a 250 mL volumetric flask and mix thoroughly. Solution was transferred to a 500 ml Erlenmeyer flask. 1 ml sulfuric acid (2N) and 5 ml of potassium iodide solution (10%) were added, Solution goes yellow. Cup of Erlenmeyer flask closed and placed in dark area for 10 min. Liberated iodine was titrated with sodium thiosulphate (0.005 N). When the solution color goes to bright yellow, a few drops of indicator starch (1%) added to it and titration was continued until the color dissipates. Iodine concentration in the salt samples was measured by the following formula [15-21]:

Iodine concentration = Used sodium thiosulphate (ml)  $\times$  0.1058  $\times$  1000 / weight of used salt [22].

## RESULTS AND DISCUSSION

Iodine concentration in 64.59% of salt samples was in acceptable limits according to national standard of

Iran. Additional information about other items has listed in Table 1 and 2.

**Table 1.** Acceptable and unacceptable percentage in edible salt of Lorestan Province, west of Iran

<b>All samples</b>	<b>240</b>
<b>Acceptable samples (%)</b>	64.59
<b>Unacceptable samples (%)</b>	35.41
<b>Total (%)</b>	100

**Table 2.** Limit of iodine concentration in edible salts of Lorestan province, west of Iran

<b>Iodine concentration</b>	<b>Percentage (%)</b>	<b>Samples no.</b>
<b>Under standard limit(&lt;20 ppm)</b>	25.83	62
<b>Allowable standard limit(20-50 ppm)</b>	64.59	155
<b>Over standard limit(&gt;50 ppm)</b>	9.58	23
<b>Total</b>	100	

Iodine is a vital micronutrient that its deficiency can cause a wide range of clinical disorders, including goiter, infertility, increased mortality, cretinism, hypothyroidism, mental retardation and most importantly high reducing of population IQ [23 -24]. Few studies were implemented in different provinces of Iran in relation to monitoring fortification of edible salts with iodine. In a survey conducted in Semnan Province, 31.2% of marketed salts iodine concentration were out of standard range [25]. In Bushehr, Iran 89% of samples were non-standard [26]. Obtained results of this study had accordance with these studies and show that intense supervision is necessary on salt fortification plants. In this study, iodine concentration was less than standard limit in a significant percentage of edible salts, and residents of Lorestan Province have potential to iodine deficiency. Ten percent of the samples have higher dose of iodine than standard limit. Therefore, continuous monitoring and more serious control are necessary.

Nowadays, availability to iodized salt in the world has increased significantly so that in many parts of the world accessing to iodized salt is considered as a main priority, but unfortunately, due to lack of proper control and monitoring, reappearance iodine deficiency disorders and goiter is seen in many parts

of the world. It seems that the lack of monitoring on salt iodization program is a major cause of goiter and iodine deficiency in the body. Salt iodization program began in countries such as Haiti, Mexico, Columbia, Guatemala, Argentina, Republic Dominican and Thailand but due to lack of regular monitoring and interrupting regular monitoring and control, iodine deficiency disorders increased gradually [27-30].

## CONCLUSIONS

To improve salt fortification status and removing iodine deficiency and goiter in society following actions should be considered: enforcing manufacturers to follow standards, continuous monitoring and control the manufacturers and marketed iodized salts, necessary legal actions against offending factories and appropriate measures by health and relevant authorities.

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