

Estimation of Urinary Iodine in Pregnant Women of Quetta City, Balochistan

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Abstract: Estimation of urinary iodine concentrations of three hundred three pregnant women in Quetta city, Balochistan was determined, in order to determine whether iodine nutrition was sufficient or not in pregnant women. The analysis of iodine in urine was done by spectrophotometric reaction in which specimens were manually digested with ammonium persulfate. The urinary value of 1.87 µg/l obtained indicated that the pregnant women were severe iodine deficient by the WHO scale. The value of 4.13µg/l indicated moderate iodine deficient, 7.92 µg/L indicated mild deficiency, 14.44 µg/L showed optimal, 23 µg/L indicated more than adequate and 34 µg/L showed more than possible excess. There is need for iodine supplementation and regular monitoring of iodine in food and iodized salt in pregnant women.

Key words: Pregnant Women • Iodine • Quetta City

INTRODUCTION

Iodine is derived from a Greek word iodise which means violet, Iodine is a chemical element that is represented by symbol I and its atomic number is 53. Under standard condition iodine is a dark brown / dark purple solid. In halogen the iodine is least reactive and most electropositive after astatine. Iodine element does not exist in Free State in nature, iodine as diatomic molecules is in form of I₂. Iodine and its compounds are used in dyes, photography and medicine, catalyst, food supplements, halogen light and also used for water purifying and starch detection. Iodine is easily soluble in water. Iodine is naturally present as a dissolved iodide in sea water, iodine is also found in several minerals and soils and marine plants. The iodine concentration in food and water depends on these factors such as rainfall, fertilizer, altitude and microbes in soil [1].

Kelp and certain plants and algae have some capability to concentrate iodine, which helps introduce the element into food sequence. An adult need approximately one tea spoon full of iodine over a life time, an average iodine requirement is fulfill by eating fish twice a week. Iodine is a micronutrient essential for the health of all individuals. Iodine is an essential trace element. It is

found in high concentration in thyroid gland, such as 70 to 80% of iodine is store in the thyroid gland 15 to 20 mg of iodine found in healthy adult body [2].

According to World Health Organization, the daily iodine intake for humans is estimated at 100-200 µg/day and even more for pregnant women. In the case of a well-balanced diet, daily iodine intake equals iodine emission. Because iodine from the human body is only excreted in urine, the quantity of urinary iodine levels is a very good test of iodine balance and iodine deficiency, respectively. Urinary iodine levels below 25 µg/L indicate a severe deficiency and a high risk of hypothyroidism for the children of these women [3-5].

Median urinary iodine concentrations in children and adults is 100–199 mcg/L, 150–249 mcg/L in pregnant women and >100 mcg/L in lactating women indicate iodine intakes are adequate [6]. Values lower than 100 mcg/L in children and non-pregnant adults indicate insufficient iodine intake, although iodine deficiency is not classified as severe until urinary iodine levels are lower than 20 mcg/L.

Urinary Iodine measurements are the most appropriate methods for assessing nutritional iodine intake. A comparatively large portion of iodine excreted in urine. The small portions are excreted in the feces [7].

Usually, individuals do not know how much iodine they are getting from food and drink but a good way to learn the iodine intake is to measure the amount of iodine in representative urine sample [8].

Iodine deficiency effects the growth and development of fetus brain during pregnancy. Thyroid hormone is vital for development of central nervous system. During period of CNS maturation the lack of thyroid hormone can result morphological and physiological abnormalities. Severe iodine deficiency during pregnancy associated with miscarriages, preterm delivery and congenital abnormalities in babies, mental retardation and problems with growth, speech and hearing. Iodine deficiency can cause maternal and fetal hypothyroidism during pregnancy and weaken neurological development of the fetus. The iodine supplementation prior or during early pregnancy reduced new cases of cretinism, increases birth mass, decreases rates of perinatal and baby death and usually increases developmental scores in juvenile children by 10-20%. Thyroid dysfunction and impairs cognitive or neurologic function in the offspring remains due to mild maternal iodine deficiency. Improving maternal and infant health by salt iodization is the primarily effective way of delivering iodine [9].

As sufficient intake of iodine during pregnancy is essential for the neurological development of the fetus, therefore, present study was conducted to estimate the urinary iodine concentration in pregnant women from Quetta city of Balochistan.

MATERIAL AND METHODS

The study was undertaken in Quetta district of Balochistan. About 303 samples of pregnant women were collected from two different hospitals and domestic area. On the spot casual urine sample aged 25 – 30 were collected in plastic bottles with screw case. The samples were stored in a refrigerator until analysis.

Urinary Iodine Determination: The urinary iodine excretion (UIE) levels were analyzed by using micro plate reading method, SandellKoltoff [10] reaction and spectroscopic analysis, in which urine samples were digested with ammonium persulphate and chloric acid. In this reaction free iodine will react with the ammonium persulphate reagent and chloric acid to remove any kind of interfering agent with the urinary iodine followed by ashing. This method produces a large amount of waste but alternative measures can be adopted to minimize

waste production, the ash is evaluated for iodine concentration by introducing on micro plate reading. Further the concentration of urinary iodine was estimated by using spectroscopic method i.e. with the help of UV/VIS spectroscopy. The urinary iodine was treated with di propyl-p-phenylenediamine to form a red-violet dye that was determined photo metrically.

RESULTS

In the present study, out of 303 pregnant women, majority were in age between 25-30, the average Iodinuria values in 91 women was 1.87 µg/L, while 151 women showed 4.13 µg/L, 24 have 7.92 µg/L, 2414.44 µg/L, 10 (23 µg/L) and 3 (34 µg/L) respectively (see Table 1). The distribution of iodine deficiency for the studied group is as follows by the WHO scale: 30% present severe iodine deficiency, 50% present moderate iodine deficiency, 8 % present mild deficiency and 8% were optimal, 3% present more than adequate and 1% showed more than possible excess

DISCUSSION

Our study is the first attempt to provide data on urinary iodine deficiency in pregnant women of Quetta city, Balochistan. The present study showed a high prevalence of iodine deficiency in urine among pregnant women's. Lack of education among pregnant women was also associated with increased risk of iodine deficiency.

The results of our study are very close to those performed in Bucharest area in 2004, which revealed a proportion of 65% pregnant women with different degrees of iodine deficiency, of whom 10.5% presented severe deficiency [11].

Other studies carried out in Romania revealed a decrease in iodine deficiency levels among pregnant women, when salt iodization became obligatory by commandment [12-14]. In Timis County, the mean urinary iodine level values measured in pregnant women's were (209.5 µg/L) considered normal, the changes in the thyroid volume and the biochemical functions of the thyroid gland being in the normal range [15]. In Hungary, 57.1% of the women of the studied group have iodine deficiency, of which 15.6% have a severe deficiency [16]. In a study made in southwest of France, the pregnant women had low urinary iodine levels (86 µg/L), these levels being correlated with the low thyroid hormones concentration and increase in volume of the thyroid gland [17].

Table 1: Average Iodinuria values in pregnant women are of Quetta city of Balochistan

Percentage	Iodinuria values in pregnant Women's					
	< 2.0	2.0-4.99	5.0-9.99	10.0-19.99	20.0-29.99	>29.9
Number of pregnant women (N)	91	151	24	24	10	3
Percentage of N	30%	50%	8%	8%	3%	1%
Iodinuria average values (µg/L)	1.87	4.13	7.92	14.44	23	34

Generally, it is accepted that mean urinary iodine levels can differ very much, usually in the normal or low range, based on a number of factors: geographical area, quality of iodized salt, daily iodine intake, etc. Other studies show different iodine deficiency levels among pregnant women. In Central Africa, an area generally considered as one with severe iodine deficiency, 40% of the subjects have less than 100 µg/L urinary iodine levels [18].

CONCLUSION

This was the first study to analyze iodine in pregnant women in Quetta city, Balochistan. Based on our findings, pregnant women have inadequate iodine concentrations. Hence, it is very important and crucial for women to attain sufficiency of iodine before pregnancy. So that when they enter pregnancy with sufficient enough stores to give birth to a healthy baby and herself remains healthy.

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