Urinary Iodine levels in Residents of Azad Jammu and Kashmir

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Abstract

Background: To evaluate the effectiveness of Universal Salt Iodization (USI) program in residents of Azad Jammu and Kashmir by measuring the Median Urinary Iodine (MUI) concentration.

Methods: In this cross sectional study 100 healthy iodized salt users, for last two years, were included. All were euthyroid upon clinical and biochemical assessment. Serum and early morning urine samples were collected for the measurement of Thyroid Stimulating Hormone (TSH) and Median Urinary Iodine (MUI) concentration respectively. Serum and urine samples were stored at -20°C till analysis. TSH was measured by Chemiluminescent technique and Urinary iodine was determined by Modified Zak method.

Results: Mean age of the subjects was 44±8 years. Study revealed that optimal level of urinary iodine was present in 82% of subjects. 1% of the subjects were severely deficient in their iodine nutrition while no one was found having MUI level more than adequate or excessive. Moderate and mild deficiency of iodine was recognized in 5% and 12% of the subjects respectively.

Conclusion: Majority (82%) have optimal level of urinary iodine excretion. It reflects that the optimal level of salt iodization in the iodized salt is provided. Iodine excess was not recorded in any of the participants. Sustained efforts must be continued to monitor USI at the country level.

Key Words: Universal Salt Iodization, Median Urinary Iodine, Iodine Deficiency Disorders, Thyroid Stimulating Hormone.

Introduction

The term Iodine Deficiency Disorders (IDD) constitutes a major nutritional problem in the world and refers to all the ill effects of iodine deficiency that can be avoided by ensuring a sufficient iodine intake in a population. Recognizing the importance of Iodine Deficiency Disorders (IDD), the United Nations in 1990 legitimated the goal of eradicating it as a public health problem by the year 2000 by recommending Universal Salt Iodization (USI) as the main policy. In northern region of Pakistan including Azad Jammu and Kashmir Iodine deficiency is known to be present since long. In mid 60’s the Pakistan Government promoted the use of iodized salt as the cost effective way of providing iodine to the affected population. Careful monitoring of progress towards elimination of IDD is essential, after implementation of USI. Majority (90%) of dietary iodine is excreted in the urine. Median Urinary Iodine (MUI) is the principal indicator of effect of USI in a population. MUI is highly sensitive to recent changes in iodine intake.
In the present study, the mean age of subjects included was 44±8 years. In present study optimal level of urinary iodide was present in 82% of subjects.

### Results

#### Table-1: Urinary Iodine Concentration as an indicator of Iodine nutrition

<table>
<thead>
<tr>
<th>Median Urinary Iodine (µg/L)</th>
<th>Iodine Nutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>Severe deficiency</td>
</tr>
<tr>
<td>20-49</td>
<td>Moderate deficiency</td>
</tr>
<tr>
<td>50-99</td>
<td>Mild deficiency</td>
</tr>
<tr>
<td>100-199</td>
<td>Optimal</td>
</tr>
<tr>
<td>200-299</td>
<td>More than adequate</td>
</tr>
<tr>
<td>&gt;300</td>
<td>Excessive</td>
</tr>
</tbody>
</table>

1. Adapted from WHO/UNICEF/ICCIDD²

#### Table-2: Urinary iodine excretion (in µg/L) reflecting the current dietary iodine status

<table>
<thead>
<tr>
<th>Median Urinary Iodine (µg/L)</th>
<th>Iodine nutrition</th>
<th>Number of subjects (n=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>Severe deficiency</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>20-49</td>
<td>Moderate deficiency</td>
<td>5 (5%)</td>
</tr>
<tr>
<td>50-99</td>
<td>Mild deficiency</td>
<td>12 (12%)</td>
</tr>
<tr>
<td>100-199</td>
<td>Optimal</td>
<td>82 (82%)</td>
</tr>
<tr>
<td>200-299</td>
<td>More than adequate</td>
<td>0</td>
</tr>
<tr>
<td>&gt;300</td>
<td>Excessive</td>
<td>0</td>
</tr>
</tbody>
</table>

Moderate and mild deficiency in iodine nutrition was recognized in 5% & 12% of subjects respectively. 1% of the study population was found severely deficient in its iodine nutrition while no one was found having MUI level more than adequate or excessive (Table-2).

### Discussion

IDD has affected about 30% population of the world.⁹ In Pakistan IDD has distressed about 50 million people of whom 6.5 million have been critically affected.¹⁰ IDD is highly prevalent in Northern areas of Pakistan and Azad Jammu and Kashmir (AJK) region.¹¹-¹³ Universal Salt Iodization (USI) program has been developed worldwide for elimination of Iodine Deficiency Disorders (IDD) and has followed a common progression; including stages of decision, implementation, and consolidation. Monitoring and evaluation are the last phases in this course but are the most vital.¹⁴

The MUI concentration is the most useful indicator for monitoring USI program for eradication of IDD and provides an excellent measure for current iodine nutrition in a population. Urinary iodine measurement can recognize overload as well as poor iodine intake.² A study from Gilgit and Hunza, a known endemic goitre area of Pakistan after 12 years of salt iodization, estimated urinary excretion of iodine by the modified Zak method. The urinary excretion of iodine in all age groups and in both sexes indicated severe deficiency in 3%, moderate deficiency in 29.54%, mild deficiency in 37.87% and 29.54% people had satisfactory levels.¹⁵ The results for satisfactory levels of MUI excretion are a little different in our study which was found 82%, while 1% was found severely deficient in iodine nutrition in our study which is quite near the finding of Gilgit and Hunza study. Results of our study are again different for moderate and mild deficiency of iodine which was present only in 5% and 12% of subjects respectively in our study. Another study done in Charsadda region of our country shows results different from our results in which urine samples of 1210 of school going children and 202 pregnant women were analyzed. The median urinary iodine concentration of school children and pregnant women was 89.9µg/L and 89.8µg/L respectively and these findings are suggestive of mild iodine deficiency. This study reports low iodine intake in district Charsadda despite use of iodized salt.¹⁶ A study in district Swabi, on 960 primary school children of both sexes revealed that 64 % of the boys and 52% of the girl students had normal urinary iodine excretion levels.¹⁷ The findings of this study are nearer to our findings of optimal iodine excretion levels. A study carried out by the University of Punjab Lahore in pregnant women during first trimester (n=254), MUI concentration was 67 µg/L indicating obvious iodine deficiency.¹⁸ Careful interpretation is required to understand the diversity of findings between results of present study and various other studies in various parts of the country as the reasons can be manifold. Iodine requirement during pregnancy is increased.¹⁹ Children are more prone to IDD and WHO recommends a daily intake of iodine of 90 µg for preschool children (0 to 59 months) and 120 µg for schoolchildren (6 to 12 yr), while the average daily requirement for iodine in euthyroid adult is 91-96 µg/d.²⁰,²¹ These facts explain the difference in results of our study from most of the other studies done in various parts of the country as our study population comprised of adults rather of pregnant women and children. Regional differences may also affect the results of such kind of studies as IDD is not only confined to the hilly areas of the country, where its prevalence is reported upto 90%, but is also prevalent to an alarming extent in the plains like Swabi, Peshawar, Islamabad, Lahore, Karachi and...
The differences in quality of salt must be considered while interpreting the results of any study regarding monitoring of USI as a cross-sectional survey in Sindh & Punjab reported that 85% of the salt tested had no iodine, 8% had iodine levels of 75 ppm, whereas 7% of the salt contained iodine between 15 and 50 ppm. Differences in use of salt by urban and rural population should also be kept in mind as in comparison to urban areas, rural households are more likely not to use iodized salt. Literacy status of the study population, availability of iodized salt in a region and awareness about advantages of iodized salt may also produce differences in the results of a study. A National survey informs that rumors about iodized salt have affected its consumption in Pakistanis for nearly two decades. Interestingly, different cooking methods have different effects on the retention of iodine in variety of food items.

Conclusion

1. Sustained efforts must be undertaken by the Government to ensure frequent monitoring of USI program
2. Magnitude of contributory factors other than iodine deficiency, i.e., environment, inheritance, region, iodized salt quality, salt packaging, literacy level, awareness, requirement as per age and cooking methods should be considered when levels of iodine supplementation are adjusted.

References