A study on use of iodized salt and iodine intake in urban and rural areas of Kanpur

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ABSTRACT

A study was conducted to assess the iodine intake in urban and rural areas of Kanpur. No visible or palpable goitre was found in the studied population. Results of the survey revealed that 92.0 per cent of the urban respondents were consuming branded packaged salt while 18.0 per cent of the rural respondents were consuming crystalline salt. In urban areas, salt consumption per person per day ranged from 8.6 to 9.9 g, while in rural area it was found to range from 10.0 to 11.1 g per person per day. Iodine content in salt samples ranged between 15.9 ppm to 31.7 ppm. Iodine intake per person per day was found 247.7 μg. The salt consumption was found to be higher in rural respondents and iodine intake by the studied population was found to be more than the recommended value i.e. 150μg.

Key words: Iodized salt, Iodine intake, Goiter, Iodine deficiency disorders(IDD), Storage of salt

Iodine is an essential element in the chemical structure of thyroid hormones. The human body requires around 150 mg of iodine everyday, which works out to be a spoonful (5g) over a life span of 70 years. Iodine deficiency leads to a reduction in the secretion of thyroid hormones and it is the most common cause of preventable brain damage. WHO estimated that 2.2 billion people are at risk of IDD in 130 countries. The term “iodine deficiency disorders” (IDD) refers to all the effects of iodine deficiency in growth and development in human and animal population, which includes goiter, abortion, still birth, neonatal and other type of hypothyroidism, but the major consequences are fetal brain damage and varying degrees of cretinism. The magnitude of IDD in India includes 167 million suffering from neurological disorder, 54 million suffering from goiter and 11 millions are cretins. In India, not even a single state is free from the problem of IDD (ICMR, 1989). Around 43% of the population does not consume adequate amounts of iodine which make them vulnerable to physical and mental disorder (Kapil, 2001). A national demographic health survey stated that only 53% of the country’s household consume enough amount of iodine although 94% of the population used iodized salt (Sharma, 2008). Therefore, the present study was conducted with the specific objective to assess the iodine intake and to estimate the iodine content in salt being used and to correlate the effect of storage distance and storage vessel on the iodine content of salt.

METHODOLOGY

The study was a cross-sectional community based field survey and laboratory work. Urban and rural areas of Kanpur were selected randomly through stratified random sampling. Total 200 families were selected, 100 from urban area and 100 from rural area. Demographic profile and information regarding their practice of storage of salt was collected through pre-tested and structured questionnaire. To estimate iodine content in salt samples, 30 g (2 table spoon) of salt from respondent’s kitchen was collected in self-sealing polythene bag and coding was done. The iodine estimation of salt samples was done in laboratory within two days after collection of samples through iodometric titration method (Tyabji, 1985).Amount of salt being consumed by the population was assessed by total amount of salt purchased divided by total number of family members. Goiter was assessed through standard palpation method.

FINDINGS AND DISCUSSION

The findings obtained from the present investigation are presented below:

Demographic profile:

It was found that 82.7% of the studied population were living in nuclear family. In urban area, 27.1% of the respondents were graduates and in rural area 6.9% of the population were illiterate. It was found that, in urban area, 46.0 per cent of the respondents had income Rs.
9000 to Rs. 16000 per month and they constituted middle income group. In rural, majority (29.0%) of the population was grouped under low income group.

Survey results revealed that 92.0% of respondents from urban area were using branded packaged iodized salt (Table 1). Brands of salt being used was also recorded and it was found that urban families were using brand like Tata, Annapurna, Captain Cook and Nirma. About 18.0% per cent of the rural respondents were using both crystal and branded salt. Satapathy et al. (2004) revealed that 22.0% per cent of the studied populations were consuming both crystalline and powdered salt whereas 7.9 per cent of the respondents were not sure about the type of salt they were consuming. In spite of ban on crystalline salt, crystalline salt was being used by 2.7 per cent of the population. It was found that 68.0% per cent of the urban population was purchasing 2 kg salt for one month whereas 73.0% per cent of the rural families were purchasing 2 kg salt/ month (Table 2). Per capita salt consumption by urban population was found to range from 8.6 to 9.9 g per day, while it was 10.1 to 11.1 g per day in rural families. Daily salt consumption was found to be higher in rural families than in urban families. Yamada et al. (2008) found the mean individual per day salt consumption of 12.4 g for adult male and 8.3 g for adult female.

Results of titration of collected salt samples revealed that iodine content in salt samples from urban areas ranged between 18.9 ppm to 31.7 ppm with an average iodine content of 28.10 ppm while in rural area iodine content in salt samples ranged from 15.9 to 28.8 ppm with an average iodine content of 25.2 ppm (Table 3). According to PFA, iodized salt should contain at least 30 ppm iodine at distribution level and 15 ppm iodine at household level (Delange and Hetzel, 2006). A study conducted in Uttar Pradesh by Kapil et al. (2001) revealed that out of 3112 powdered salt samples, only 3.4 per cent had nil iodine content and 56.6 per cent had iodine content of 15ppm or more. Kapil (2001) observed that more than 90% of the salt samples were iodized with the exception of Goa and Rajasthan. In states Bihar, Punjab, Himachal Pradesh, more than 80 per cent of the salt samples had an iodine content of 15 ppm or more. It was found that per person per day iodine consumption ranged from 162.5 mg to 313.8 mg in urban area, and 160.6 mg to 319.7 mg in rural area. On average iodine consumption per person per day was found to be 247.7 mg.

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<th>Table 1: Type of salt used by the respondents</th>
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<th>Table 3: Estimated iodine content in collected salt samples</th>
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It was found that 47% urban respondents were using glass containers for salt storage. In rural area, 32.0% of the respondents were using steel containers whereas 8% of the rural respondents were using earthenware pot for salt storage (Fig. 1). It was found that material of salt container affected the iodine content of the salt. The mean iodine content in salt stored in glass container was found to be maximum (28.10 ppm) followed by plastic container, in which mean iodine content was found to be 27.20 ppm (Fig. 2). In earthenware pot, iodine content in salt was

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found to be lowest (21.99 ppm). The F value was found to be positively significant at 5% level. Jaishree and Naik (2002) reported that highest per cent of retention of iodine was noticed in salt stored in glass jars (97.97%). Patowary et al. (1995) stated that within a month and a half, the iodine content of salt stored in earthenware pot is reduced to about 23.0%.

It was found that the mean iodine content of the salt, stored at >4m distance from cooking area was found to be maximum (28.83 ppm), the mean iodine content of the salt stored near to the cooking area was found to be minimum (21.01 ppm). The difference in iodine content of salt stored at different distance from cooking area was found to be significant at 5% level (Fig. 2). Iodine is a volatile substance. Improper storage and domestic handling of iodized salt leads to loss of iodine from salt-iodine mixture. Keeping iodized salt near chulha or cooking range, leads to significant loss of iodine from the salt (ncert. nic.in).

It was found that the education is related with the iodine content in salt. Maximum iodine (28.66 ppm) was found in the salt samples of highly educated group. The mean iodine content in salt was found to be least (20.89 ppm) collected from families in which the housewives were illiterate. The F value was found to be significant at 5% level. There was high iodine content found in salt of educated group as high rate of literacy and level of education allowed the population to understand and act upon information regarding iodized salt. There was significant difference in mean of iodine found in different income groups. This was due to more exposes of high income group to media from where improved practices of handling of salt are observed. A similar study in Ludhiana revealed that high level of iodine was found in high income group (Singh et al., 1996).

Total 1,875 number of population examined for goitre prevalence but no visible or palpable goitre was observed in the studied population. A study conducted by Kapil et al. (2001) in Kanpur (U.P.) concluded that the median urinary iodine excretion of children was 10.5 mg/dl, indicating an iodine sufficient nutriture in the area.

Conclusion:

It was concluded from the present study that the iodine intake in urban and rural areas was found to be more than the recommended value i.e. 150 mg. All the salt samples were iodized and contained iodine content more the 15 ppm which is adequate. Still families are consuming branded iodized and crystal salt in their daily diet. There is scope to educate the population regarding proper storage and handling practices of iodized salt but the improper storage practices and low education level affect adversely iodine content of salt.

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