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Iodine Nutritional Status among Lactating Mothers of Murshidabad District in West Bengal

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Abstract

In post salt iodization phase, endemic goiter was found prevalent all over the India including West Bengal. Prevalence of goitre among school children and pregnant women has been reported in Murshidabad district. But iodine nutritional status and prevalence of goitre along with associated iodine deficiency disorders of lactating mother has not been reported in the Murshidabad district of West Bengal. In total, 543 lactating mothers (aged between 18-40 yr) were clinically examined for goitre from five Sub divisions of Murshidabad district. The overall goitre prevalence was found to be 13.1%. Most of the goitre was palpable (grade 1) however visible goitre (grade 2) also existed. In the studied population, post prevalent abnormalities were feeble mindedness (41.6%), followed by deaf mutism (13.1%), squint (1.5%), miscarriage (5.9%) and stillbirth (1.7%). Urinary iodine and thiocyanate concentrations were measured for all subjects and the mean urinary iodine and mean urinary thiocyanate levels were found to be 12.6±8.9 µg/dl and 0.610±0.21 mg/dl. The overall observations suggest that lactating mothers of the studied region of Murshidabad district in West Bengal are affected by goitre as per clinical investigation. But urinary iodine excretion pattern shows that there was no biochemical iodine deficiency. The people of the studied region consume foods containing thiocyanate precursors as evidenced by urinary thiocyanate excretion pattern. Thus inspite of the consumption of adequate iodine, existing goitre prevalence may be due to the consumption of dietary goitrogens/antithyroid substances that possibly come through food and water.

Keywords: Iodine, lactating mother, urinary iodine, urinary thiocyanate

Introduction

Iodine is an important micronutrient found in water, soil and plants. Man needs iodine to make thyroid hormones, essential for normal development of the brain and maintenance of the body heat and energy. Lack of iodine in the diet leads to visible and invisible spectrum of health consequences known as iodine deficiency disorders or IDD (Hetzel, 1983). The major consequences of iodine deficiency are goitre (enlargement of thyroid gland than normal), mental defect, deaf mutism, stillbirth and miscarriage, weakness and paralysis of muscles as well as lesser degree of physical and mental function (Hetzel, 1987). Besides, iodine deficiency also affects the socio-economic development of a community (Levin, 1987). In the large area of Gangetic West Bengal, the population of all ages and both sexes irrespective of their socio-economic status are severely affected by endemic goitre and associated iodine deficiency disorders (IDD) in spite of the consumption of iodized salt. The reported areas are Howrah district, Sundarban delta of South 24- Parganas & North 24- Parganas districts (Chandra et al 2004, 2005, 2006). Prevalence of goitre among school children (6-12 yr) of the Murshidabad district of West Bengal was already reported (Tripathy et al 2013, Tripathy 2013). Iodine nutritional status among pregnant women of Murshidabad district in West Bengal was also reported (Tripathy 2015).

Present investigation was thus undertaken to find out the prevalence of endemic goitre and iodine nutritional status among lactating mothers of Murshidabad district as per specification endorsed by the joint WHO/UNICEF/ICCIDD 1994. To fulfill the objectives, we studied the total goiter rate, urinary iodine and thiocyanate excretion pattern of the studied population. Attempt has also been made to evaluate the occurrence of associated iodine deficiency disorders (IDD).

Materials and Methods

Profile of the study district

Murshidabad is one of the important and historical districts in West Bengal. There are 26 C D Blocks under 5 sub-divisions in Murshidabad district. Despite the progress of West Bengal in every way there is no significant change observed in Murshidabad district. Poverty and illiteracy are very common. Most of the people are engaged in agricultural activities.

Selection of participants and analysis

Overall 543 lactating mothers (aged between 18-45 yrs) were clinically examined for goitre from five sub-divisions, Berhampore Sadar, Domkol, Murshidabad-Jiaganj, Kandi and Farakka. To evaluate the occurrence of associated iodine deficiency disorders every lactating mother was examined or enquired individually. Urinary iodine and thiocyanate concentration were measured in all subjects. Iodine in urine was determined by the arsenite method following dry ashing in the presence of potassium carbonate (Karmarkar et al 1986) maintaining internal quality control having a known concentration range of each batch of test samples. Urinary thiocyanate concentration was measured from same urine samples used for the analysis of iodine by the method of Aldridge 1945 as modified by Michajlovskij and Langer 1958.

Results and Discussion

Goitrous population of the studied region was classified into two groups -Grade 1 and Grade 2 following the classification endorsed by WHO/UNICEF/ICCIDD 1994. The overall goitre prevalence of 13.1% indicates that IDD is moderate degree of endemicity as a public health problem in the district as per the recommendation of WHO/UNICEF/ICCIDD 1994 (Table 1). Most of the conditions were palpable (Grade 1) however visible goitre (Grade 2) also existed.

Table 1 : Associated Iodine Deficiency Disorders (IDD) among the lactating mother of Murshidabad district in West Bengal (N=543)

Sl.No.	Associated IDDs	No. of Population
1	Feeble mindedness	226 (41.6%)
2	Deaf mutism	71 (13.1%)
3	Squint	8 (1.5%)
4	Miscarriage	32 (5.9%)
5	Stillbirth	9 (1.7%)

It is well known that the major consequences of iodine deficiency are goitre (enlargement of thyroid gland than normal) along with associated iodine deficiency disorders like mental defects, deaf mutism, still birth and miscarriages, weakness and paralysis of muscle as well as lesser degree of physical and mental function (Levin 1987). To evaluate the occurrence of associated iodine deficiency disorders every individual lactating mother was examined or asked. In the

studied population, most prevalent abnormalities were feeble mindedness (41.6%) followed by deaf mutism (13.1%), squint (1.5%), miscarriage (5.9%) and stillbirth (1.7%). (Table 2)

Table 2 : Prevalence of goiter among lactating mother of Murshidabad district in West Bengal

Sl. No.	Study area (Sub-Division)	No. of population studied	Grade – 1 goitre	Grade - 2 goitre	Total goitre
1	Berhampore Sadar	116	14 (12.07%)	4 (3.45%)	18 (15.52%)
2	Domkol	106	11 (10.38%)	2 (1.89%)	13 (12.26%)
3	Murshidabad-Jiaganj	103	08 (7.77%)	1 (0.97%)	09 (8.74%)
4	Kandi	110	13 (11.82%)	3 (2.73%)	16 (14.54%)
5	Farakka	108	13 (12.04%)	2 (1.85%)	15 (13.89%)
Total		**543**	**59 (10.9%)**	**12 (2.2%)**	**71 (13.1%)**

The iodine excretion pattern of the lactating mothers was measured. Urinary iodine is the most important biochemical indicator that indicates current state of iodine nutrition also used as a valuable indicator for the assessment of IDD because 90% body's iodine is excreted through urine (Marwaha et al 2003, Chandra & Ray I 2002). For lactating mother, a median Urinary Iodine Concentration (UIC) of 10 µg/dl can be used to define adequate iodine intake; although lactating mother have the same requirement as pregnant women, however, the median urinary iodine of lactating mother is lower because iodine is excreted in breast milk. Pal et al (2017) reported a median UIC of 18.5 µg/dl in the lactating mothers from rural areas of 24- Parganas district of West Bengal. In the present study the mean and median urinary iodine values were 12.6 ± 8.9 and 13.1 µg/dl (Table 3). The median value was greater than 10 µg/dl indicating that there is no iodine deficiency as per the guidelines of the WHO/UNICEF/ICCIDD. The amount of thiocyanate in urine is a good indicator for the presence of goitrogens in food(Queriodo et al 1974). Consumption of excess cyanogenic plants in relation to iodine intake is considered as an etiological factor for the persistence of iodine deficiency disorders in certain regions in India. (Delange et al 1982). Moreover, in spite of salt iodization residual goitre still persists in many regions of West Bengal (Chandra et al. 2004, 2005, and 2006). Marwaha et al. 2003 reported that thiocyanate appears to play an important role in goitre formation among poor children in India on post salt iodization phase. It has been mentioned that the mean value obtained from non-

endemic population was 0.504 ± 0.197 mg/dl. In the present study the mean urinary thiocyanate level was 0.610 ± 0.21 mg/dl. (Table 3). This value indicates that the involvement of excess thiocyanate may have an important role for the persistence of goiter among the studied population.

Table 3: Urinary iodine and thiocyanate concentration level in lactating mother of Murshidabad district in West Bengal

Sl.No.	Study area (Sub-Division)	No. of Urine sample	Urinary iodine (UI) (µg/dl) Mean ± SD	Median UI (µg/dl)	Urinary thiocyanate (USCN) (mg/dl) Mean ± SD	Median USCN (mg/dl)
1	Berhampore Sadar	116	13.9 ± 8.4	13.6	0.689 ± 0.23	0.683
2	Domkol	106	12.2 ± 6.5	12.7	0.623 ± 0.18	0.633
3	Murshidabad-Jiaganj	103	11.9 ± 7.4	12.2	0.642 ± 0.29	0.653
4	Kandi	110	14.2 ± 7.9	13.9	0.518 ± 0.19	0.511
5	Farakka	108	12.9 ± 8.2	13.3	0.594 ± 0.24	0.583
Total		**543**	**12.6 ± 8.9**	**13.1**	**0.610 ± 0.21**	**0.611**

Conclusion

This study reveals that clinically the lactating mothers are iodine deficient as evidenced by prevalence of goiter but biochemically they have no iodine deficiency as evidenced by their urinary iodine excretion pattern. Urinary thiocyanate pattern shows that they are consuming high level thiocyanate containing foods. More investigation is necessary to arrive at certain definite cause of prevalence of endemic goiter in the studied population.

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