Prevalence and Risk Factors of Iodine Deficiency Disorder (Idd) Among Pregnant Women in District Hospital of Sindhupalchowk, Nepal

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ABSTRACT

Iodine deficiency disorder (IDD) is a major micronutrient deficiency problem in Nepal. In some isolated mountainous areasof Nepal, most of the adult women have goiters, and up to 10% of the population suffered from cretinism, the severest form of IDD. The objective of this study was to determine the prevalence of iodine deficiency among pregnant women receiving care at Chautara Hospital, Sindhupalchowk. This cross-sectional study was conducted in 2012 at ChautaraHospital, Sindhupalchowk, Nepal, located in a hilly district with relatively high IDD. We enrolled pregnant women undergoing antenatal care at Chautara Hospital from January to June 2012.A total of 98 pregnant women were included in the study. Urine samples were collected from each woman and were analyzed for urine iodine estimation. Among a total of 98 pregnant women, the majority (76.5%) were in the age group 21–35 years. The mean age was 23.4 years. Using World Health Organization criteria of urinary iodine excretion for pregnant women, 28.6% (28 women) had severe iodine defi ciency, 31.6% (31 women) had adequate iodine nutrition, 34.7% (34 women) were at risk for iodine-induced hyperthyroidism, and 5.1% (5 women) were at risk for adverse health consequences. This evidence shows that a signifi cant proportion of pregnant women still suffer fromsevere IDD. Health promotion, educational interventions, and continuous assessment for IDD in rural settings need to be intensifi ed to achieve the iodine deficiency elimination target by 2017.

Keywords: Iodine deficiency, Urine iodine, Pregnant women, Intervention

INTRODUCTION

Approximately 35% of the world's population has insufficient iodine intake, and they are at risk of iodine deficiency disorder (IDD).[1] IDD is the world's single most significant cause of preventable brain damage and mental retardation. Iodine deficiency during pregnancy has also been associated with infant mortality, miscarriage, stillbirth, and low birth weight.[2]

IDD is an important major micronutrient deficiency problem in Nepal. In some isolated mountainous areas of Nepal, most of the adult women havegoiters, and up to 10% of the population suffer from cretinism, the severest form of IDD.[3] World Health Organization (WHO) and International Council for the control of Iodine Defi ciency Disorders (ICCIDD) guidelines suggest an iodine intake of 200 to 300 µg per day for pregnant and lactating women, which is higher than the requirement for non-pregnant women of 150 µg per day.[4] This is because of an increase in maternal thyroxine hormone production necessary for transferring the hormone to the fetus. Iodine also needs to be transferred trans-placentally to the fetus for fetal thyroxine production. Urinary iodine (UI) is an important and valid indicator for iodine deficiency. It reflects the excretion of excess iodine following recent dietary intake.[5]

The Ministry of Health and Population in Nepal has prioritized IDD in its Nutrition Policy and Strategy 2004. The goal is to eliminate IDD from Nepal by 2017.[6] With this motivation in mind, this study was designed to screen for iodine deficiency among pregnant women receiving care at Chautara Hospital, Sindhupalchowk, by analyzing urinary iodine. This study also provided health education to women of rural communities regarding the use of iodized salt (one with the logo of two children on the packet); which is the iodized salt manufactured by the government of Nepal.

MATERIALS AND METHODS

We designed a hospital-based, cross-sectional study to determine the status of IDD among pregnant women receiving care at Chautara Hospital in Sindhupalchowk, Nepal over a period of 6 months (January to June 2012). Sindhupalchowk district is situated in a hilly region of Central Nepal. We enrolled 98 pregnant women who presented for antenatal care. Urine samples were collected from all 98 women for analysis of urinary iodine excretion (UIE) to screen for IDD status. The urine samples were collected in clean leak-proof containers. The collected urine samples were kept refrigerated at -20^{0}C until analysis. The samples were analyzed using Sandell-Kolthoff

reaction. The UIE analysis was conducted at BP Koirala Institute of Health Sciences (BPKIHS), Dharan, Nepal.

The women's knowledge of IDD was also assessed. After obtaining the results of urinary iodine screening, the pregnant women were counseled, and health education was provided regarding the importance of iodine intake during pregnancy. Health education was provided to 150 women, including the 98 pregnant womenin this study.

Validity and reliability of the study was maintained through training of the research assistants and following the literatures. Collected data were entered into SPSS version 13 and analyzed. Descriptive analysis was conducted. The WHO classification of IDDs on the basis of UIE for pregnant women was used (Table 1).

Table 1: WHO classification of iodine deficiency disorders (IDD) on the basis of urinary iodine excretion for pregnant women.

Median urinary iodine (µg/L)	Iodine intake	Iodine status
<150 µg/L	Insufficient	Severe iodine deficiency
150-249 µg/L	Adequate	Adequate iodine nutrition
250–499 µg/L	Above requirements	Risk of iodine induced hyperthyroidism
≥500 µg/L	Excessive	Risk of adverse health consequences

RESULTS

Among a total of 98 pregnant women, about one-tenth (11.2%) of the enrolled women had a history of still birthin a previous pregnancy. About 28.6% of the women had not heard about iodized salt, although, the use of the iodized salt in the household was approximately 91.8% (Table 2).

Table 2: Iodine related information from the pregnant women

Characteristics	Number	Percent
Heard about iodized salt		
Yes	70	71.4
No	28	28.6
Use iodized salt in household		
Yes	90	91.8
No	8	8.2

Among the 98 urine samples analyzed, 28.6% (28 women) had severe iodine deficiency, 31.6% (31women) had adequate iodine nutrition, 34.7% (34 women) were at risk for iodine-induced hyperthyroidism, and 5.1% (5 women) were at risk of adverse health consequences (Table 3).

Regarding age-wise distribution of urinary iodine excretion, the highest insuffi cient iodine levels were found in the age groups 21-35 years (30.7%) and under 20 years of age (22.7%). It was found that more illiterate women who could not read and write (54.5%) had insufficient iodine levels as compared to literate women.Similarly, among women who had not heard about iodized salt, 46.4% had insufficient iodine intake, and among those who did not use iodized salt, 62.5% had insufficient iodine intake.

Table 3: Urinary iodine excretion level and iodine intake status

UIE level (µg/l)	Number	Percent
Insufficient (<150)	28	28.6
Adequate (150-249)	31	31.6
Above requirements (250-499)	34	34.7
Excessive (>500)	5	5.1

DISCUSSION

Our study revealed that a significant proportion of pregnant women had insufficient iodine intake. Knowledge regarding the use of iodized salt and IDD also remains poor in hilly region of Nepal. The recommended daily intake of iodine during pregnancy is 250 µg/day. About 80% to 90% of the iodine intake is excreted through the kidneys. Determination of median UIE is an important population-based measure to determine iodine intake. Both demand for and clearance of iodine increases during pregnancy. In 1993, WHO initiated the global primary intervention strategy for IDD control by universal salt iodization. Salt was chosen because of its easy availability, low cost, and its use year round in food products. However, the Nepal Salt Trading Corporation is the only manufacturer of iodized salt in the country. Being a landlocked country within the Himalayan mountain range, with most of the population living in rural areas, there can be decay of the iodine before it reaches the individual households.[5] Moreover, there is lack of proper storage of the salt.

The Nepal Micronutrient Status Survey was completed in 1998. Mean urinary iodine in pregnant women was found to be 114.1µg/l for those aged 15 to 49 years. From a review of the literature, our study results were very similar to some other studies that evaluated the urine iodine content in pregnant women in Nepal.[5, 7] Baral *et al* performed an assay of iodine deficiency status in three ecological regions of Nepal, and hilly regions (11.2%) were found to be more iodine deficient than mountainous regions (9%).[8] A study carried out to look at the type of household salt used showed that among the 707 salt samples collected, 38.2% were crystal salt. Only about 17.3% of the household salt had inadequate iodine level < 15 ppm.[9] In developed countries like the United States, the NHANES 2005-2010 study revealed median urine iodine excretion of 129 µg/L during pregnancy, while women in their third trimester had median urine iodine excretion of 172 µg/L.[9] We found poor knowledge regarding the use of iodized salt and IDD in women from this hilly region of Nepal. Murdoch *et al* assessed the knowledge and use of iodized salt among Sherpa residents of the Khumbu regions of Nepal.[11] Only 11% of the surveyed people were aware of IDD and goiter. About 44% regularly consumed iodized salt, but most people preferred granulated salt from the market.[11]Joshi *et al* estimated the iodine content of the household powdered salt in three districts of Nepal and concluded that people are still routinely using non-iodized salt.[12] Salt iodine estimation at individual household levels, as well as how salt is stored, additionally need to be assessed in future studies.

In conclusion, to eliminate IDD from the country of Nepal, facility-based antenatal care services and IDD assessments should be strengthened in rural areas. Health promotion and educational interventions need to be intensified, and the educational intervention focus needs to be on the benefit of iodized salt, proper storage, and the increased need for iodine during pregnancy and lactation.

ACKNOWLEDGEMENT

The authors thank Rajan Malla and Noriko Malla for their support for the study.

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