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Original Research Article.

Analysis of Nutritional Status of Iodine Among Pregnant Women at a Tertiary Care Centre

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ABSTRACT

Background: Iodine, a trace element, is critical in synthesis of thyroid hormones in humans. The latter is essential for vital functions of human body, including normal growth and development. This study was conducted to assess the status of iodine among pregnant women.

Materials and Methods: This study comprised of 100 pregnant women. The participants were explained about the procedure and were asked to give consent. All subjects provided spot urine and home salt samples. Urine samples were gathered in a sterile plastic container and stored at 4°C. Urinary iodine levels were estimated within fifteen days of sample collection. Salt consumption was estimated using the monthly edible salt procurement method. Statistical analysis was conducted using SPSS software.

Results: In this study, 12 females belonged to the age group of 18-22 years. 56 subjects belonged to the age group of 23-27 years. 32 women belonged to the age group of 28-30 years. The household salt iodine concentration between 0-4.9 ppm was seen in 9 women, the concentrations between 5-14.9 ppm were seen in 16 subjects while 15 or more than 15 ppm iodine concentration was seen in 75 women. Less than 150 ppm urinary iodine concentration were evident in 9 women, 150-249 ppm urinary iodine concentration was seen in 6 women, 250-499 ppm urinary iodine quantities were observed in 83 women and over 500 ppm urinary iodine was noticed in 2 women only.

Conclusion: Majority of the women had urinary iodine concentrations more than the required levels. Also, most of the women had 15 or over 15 ppm household iodine concentrations.

Keywords: Iodine, Salt, Household, Urinary, Pregnancy

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INTRODUCTION

Iodine, a trace element, is critical in synthesis of thyroid hormones in humans. The latter is essential for vital functions of human body, including normal growth and development. Deficiency of iodine leads to inadequate synthesis of thyroid hormones, eventually resulting in disease conditions that are collectively known as iodine deficiency disorders (IDDs). Iodine deficiency is the single most important preventable cause of brain damage globally.[1]

As per the most recent estimates, almost 1.88 billion people were at the risk of iodine deficiency because of insufficient iodine intake, (Urinary Iodine Concentration [UIC] cutoff of <100 µg/L).[2] In India, 335 out of 386 surveyed districts were endemic for IDD (total goiter rate >5%).[3] Daily demand for iodine during pregnancy increases to 250 µgm as compared to 150 µgm for nonpregnant women.[4] Failure to meet this increased iodine demand, results in the insufficient supply of thyroid hormones to the developing brain[5], resulting in mental retardation in the newborn.[6] This study was conducted to assess the status of iodine among pregnant women.

MATERIALS AND METHODS

Present study was conducted in Department of Community Medicine, Sri Muthukumaran Medical College Hospital and Research Institute, Chennai, Tamil Nadu, India. This study comprised of 100 pregnant women. The participants were explained about the procedure and were asked to give consent. All subjects provided spot urine and home salt samples. Urine samples were gathered in a sterile plastic container and stored at 4°C. Urinary iodine levels were estimated within fifteen days of sample collection. Salt consumption was estimated using the monthly edible salt procurement method. Statistical analysis was conducted using SPSS software.

RESULTS

12 females belonged to the age group of 18-22 years. 56 subjects belonged to the age group of 23-27 years. 32 women belonged to the age group of 28-30 years. The household salt iodine concentration between 0-4.9 ppm was seen in 9 women, the concentrations between 5-14.9 ppm were seen in 16 subjects while 15 or more than 15 ppm iodine concentration was seen in 75 women. Less than 150 ppm urinary iodine concentration were evident in 9 women, 150-249 ppm urinary iodine concentration was seen in 6 women, 250-499 ppm urinary iodine quantities were observed in 83 women and over 500 ppm urinary iodine was noticed in 2 women only.

Table 1: Age-wise distribution of subjects.

Age	Number of subjects	Percentage
18-22 years	12	12%
23-27 years	56	56%
28-30 years	32	32%
Total	100	100%

Table 2: Iodine status among pregnant women

Variable	Quantity
Household salt iodine concentration (ppm)	
• 0-4.9	09
• 5-14.9	16
• ≥15	75
Urinary iodine concentration (ppm)	
• <150 (insufficient)	09
• 150-249 (adequate)	06
• 250-499 (above requirement)	83
• ≥500 (excessive)	02

DISCUSSION

Iodine is an essential micronutrient required for production of thyroid hormones. Iodine deficiency (ID) is the principal factor responsible for abnormal physical and mental development among children.[7] All age groups are affected by ID, but growing children and pregnant mothers (PMs) are the most vulnerable as they are sensitive to even marginal ID.[8] During pregnancy, the requirement of iodine increases to 250 µg/day when compared to normal adult (150 µg/day) to meet the higher metabolic demands of thyroxin (T4) production, transfer iodine to fetus and increased renal iodine clearance by the mother.[8]

Inadequate consumption of iodine by the PM, leads to insufficient production of thyroxin by the fetus resulting in retarded fetal growth. ID increases the risk of still birth, abortions, increased perinatal deaths, infant mortality, and congenital anomalies.[9] Children born to iodine deficient PMs often results in stunted growth, cretinism and have lower intelligent quotient scores.[10]

This study was conducted to assess the iodine status among pregnant women.

In this study, 12 females belonged to the age group of 18-22 years. 56 subjects belonged to the age group of 23-27 years. 32 women belonged to the age group of 28-30 years. The household salt iodine concentration between 0-4.9 ppm was seen in 9 women, the concentrations between 5-14.9 ppm were seen in 16 subjects while 15 or more than 15 ppm iodine concentration was seen in 75 women. Less than 150 ppm urinary iodine concentration were evident in 9 women, 150-249 ppm urinary iodine concentration was seen in 6 women, 250-499 ppm urinary iodine quantities were observed in 83 women and over 500 ppm urinary iodine was noticed in 2 women only. Caldwell KL et al (2013)[11] presented iodine data from National Health and Nutrition Examination Survey (NHANES) and from a sample of pregnant women in the National Children's Study (NCS) Vanguard Study. Urinary iodine (UI) was measured in a one third subsample of NHANES 2005–2006 and 2009–2010 participants and in all 2007–2008 participants age 6 years and older. These measurements are representative of the general U.S. population. UI was also measured in a convenience sample of 501 pregnant women enrolled in the NCS initial Vanguard Study from seven study sites across the United States. NHANES median UI concentration in 2009–2010 (144 µg/L) was significantly lower than in 2007–2008 (164 µg/L). Non-Hispanic blacks had the lowest UI concentrations (131 µg/L) compared with non-Hispanic whites or Hispanics (147 and 148 µg/L, respectively). The median for all pregnant women in NHANES 2005–2010 was less than adequate (129 µg/L), while third trimester women had UI concentrations that were adequate (median UI 172 µg/L). Third trimester women participating in the NCS similarly had an adequate level of iodine intake, with a median UI concentration of 167 µg/L. Furthermore, NCS median UI concentrations varied by geographic location. Dairy, but not

salt, seafood, or grain consumption, was significantly positively associated with median UI concentration in women of childbearing age. Pregnant women in their third trimester in the NHANES 2005–2010 had adequate median UI concentrations, but pregnant women in NHANES who were in their first or second trimesters had median UI concentrations that were less than adequate. Non-Hispanic black pregnant women from both the NHANES 2005–20010 and the NCS consistently had lower UI median concentrations than non-Hispanic whites or Hispanics. Grewal E et al (2013)[12] assessed the iodine status of pregnant women, using median urinary iodine concentration (MUI) as the measure of outcome, to document the impact of advancing gestation on the MUI in normal pregnancy. This study assessed the MUI in casual urine samples from 50 pregnant subjects of each trimester and 50 age-matched non-pregnant controls. The median (range) of urinary iodine concentration (UIC) in pregnant women was 304 (102-859) µg/L and only 2% of the subjects had prevalence of values under 150 µg/L (iodine insufficiency). With regard to the study cohort, median (range) UIC in the first, second, and third trimesters was 285 (102-457), 318 (102-805), and 304 (172-859) µg/L, respectively. Differences between the first, second, and third trimesters were not statistically significant. The MUI in the controls (305 µg/L) was not statistically different from the study cohort. The pregnant women had no iodine deficiency, rather had high median urinary iodine concentrations indicating more than adequate iodine intake. Larger community-based studies are required in iodine-sufficient populations, to establish gestation-appropriate reference ranges for UIC in pregnancy.

CONCLUSION

Majority of the women had urinary iodine concentrations more than the required levels. Also, most of the women had 15 or over 15 ppm household iodine concentrations.

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