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Iodine Nutritional Status among Adolescent Girls in Uttarakhand, India

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Abstract

Introduction: Uttarakhand (UK) state is a known endemic region for Iodine deficiency.

Objective: To assess iodine nutritional status among adolescent girls in districts: Udham Singh Nagar (USN), Nainital (N) and Pauri (P) of UK state.

Methods: In each district, 30 clusters (schools) were identified by using population proportionate to size cluster sampling. In each school, 60 girls (12–18 years) attending the schools were included. Total of 5430 girls from USN (1823), N (1811) and P (1796) were studied. Clinical examination of thyroid of each girl was conducted. From each cluster, spot urine and salt samples were collected.

Results: Total goiter rate was found to be 6.8% (USN), 8.2% (N) and 5.6% (P). Median urinary iodine concentration levels were 250 μg/l (USN), 200 μg/l (N) and 183 μg/l (P).

Conclusion: Findings of the study documented that adolescent girls had adequate iodine nutritional status in the three districts of UK.

Keywords: goiter, iodine deficiency disorders, salt iodization, urinary iodine concentration

INTRODUCTION

Iodine deficiency disorder (IDD) is a public health problem in India. Iodine deficiency (ID) in pregnancy increases the risk of stillbirth, abortions, perinatal deaths, infant mortality and congenital anomalies [1]. The adolescent girls (AGs) are future mothers; ID in them can affect the newborns, resulting in neonatal hypothyroidism. Uttarakhand (UK) state is a known endemic region for ID. We do not have data on iodine nutritional status of AGs from UK state. Thus, the

present study was conducted in the year 2014, with an objective of assessing iodine nutritional status among AGs (12–18 years) in three districts [Udham Singh Nagar (USN), Nainital (N) and Pauri (P)] of UK. The school enrollment of AGs was >90%; hence, school-based approach was adopted. All schools in rural and urban areas in the district with their respective child enrollment were enlisted. The 30 schools (clusters) were selected according to population proportionate to size methodology [2]. In each school, AGs were briefed about the objectives of the study, and informed consent was undertaken. In each identified school, 60 AGs were selected. Clinical examination of thyroid of each AG was conducted. Grading of goiter was done according to the criteria recommended jointly by World Health Organization (WHO)/The United Nations Children's Fund/International Council for the Control of Iodine Deficiency Disorders: (i) Grade 0—not palpable and not visible; (ii) Grade I—palpable but not visible; and (iii) Grade II—palpable and visible. From each cluster, 'on the spot' urine samples and salt samples were collected from 20 AGs selected randomly. The urinary iodine concentration (UIC) levels were analyzed using wet digestion method [3], and iodine content of salt was analyzed by standard iodometric titration method [4]. The project was approved by ethical committee of All India Institute of Medical Sciences, New Delhi.

Keeping in view anticipated prevalence of 12.0%, confidence level of 95% and absolute precision of 1.5%, a sample size of 1751 was calculated, to be covered from each district. However, we included 1823 (USN), 1811 (N) and 1796 (P) of AGs from each district.

In the present study, total goiter rate (TGR) was found to be 6.8% (USN), 8.2% (N) and 5.6% (P). The median UIC levels were 250 µg/l (USN), 200 µg/l (N) and 183 µg/l (P), indicating adequate iodine status among the studied population. It was found that 59.0% (USN), 44.0% (N) and 46.0% (P) of salt samples had iodine content of >15 ppm. A recent study published in *Lancet*, conducted among 14–15 years girls, reported presence of mild ID (51.0%), moderate deficiency (16.0%) and severe deficiency (1.0%) in the subjects studied [5]. In India, there is lack of data available on iodine nutritional status among AGs. Majority of the studies have been conducted on either school-age children or on pregnant mothers for establishing the presence of ID in a region [6–8]. According to WHO, the median UIC level of <100 µg/l among AGs indicates ID in the community. In the present study, median UIC levels were adequate, i.e. >100 µg/l in all the three districts of UK, indicating adequate iodine status. Earlier studies conducted in Bangladesh among adolescent children reported the median UIC level of 186.3 µg/l and 135 µg/l, respectively [9, 10].

The UIC level indicates the current iodine status, and TGR indicates past chronic iodine status. Thus in the present study, UIC levels were adequate and TGR was >5%, indicating that the three districts in UK are in the transition phase from iodine insufficiency to iodine sufficiency.

Findings of the present study documented the successful implementation of national IDD control program, under which iodized salt is supplied to all three districts of UK. There is a need of sustaining the efforts of universal salt iodization, so that the AGs have adequate iodine content in their diet and they enter reproductive stage with sufficient iodine nutriture.

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