Congenital Hypothyroidism Screening with Umbilical Cord Blood: Retrospective Analysis

Incidence of congenital hypothyroidism varies across countries and different geographic regions. A retrospective analysis of cord blood thyroid stimulating hormone values, and their subsequent follow-up, was done in a tertiary-care center in Kerala, India. Congenital hypothyroidism was found at the rate of 1 in 244, which is higher than reported incidence from other centers.

Keywords: *Congenital hypothyroidism, Incidence, Goiter.*

Congenital hypothyroidism has a worldwide incidence of 1 in 4000. A higher incidence has been reported from India [1]. The objective of our study was to ascertain the incidence of congenital hypothyroidism in South Malabar area.

Our study was conducted in a tertiary care hospital in Calicut, Kerala. We conducted a retrospective analysis of umbilical cord thyroid stimulating hormone (TSH) values. All inborn deliveries – from October 2012 to October 2013 – in a tertiary care hospital in Calicut, Kerala, were included. TSH, FT4 and FT3 were assayed by chemiluminiscent immunoassay method. A mixed cord blood sample obtained soon after birth was sent immediately for assay TSH. All cord blood TSH values of more than 10 mU/L were followed up at 72 hours of age with a repeat TSH estimation. Those babies with a rising trend in TSH were evaluated with TSH, FT4 and FT3 on day 5 of life. Subsequent follow up was done at 2 weeks of age in individual cases. Congenital hypothyroidism was diagnosed if TSH on day 5 was >40 mU/L with a low FT4 or if at 2 weeks of age the TSH >10 mU/L with low FT4 [2]. Radio nuclear scanning was not done in all cases prior to treatment. Data retrieved from electronic medical records were analyzed by SPSS version 16.

We excluded 120 cases from the analysis, which included perinatal deaths, those lacking adequate follow ups, and those where a proper cord blood sample could not be obtained. Total numbers of samples included in the analysis were 1950 (1268 female) out of which 1551 were term and 397, preterm. Median cord blood TSH value was 6.5 mU/L. Based on our policy of rescreening those with a cord TSH of >10 mU/L, 403 babies needed rescreening at 72 hours. Upon rescreening at 72 hrs, 41 babies had a rising trend in TSH. Out of these 41 cases, eight cases were diagnosed to have hypothyroidism on follow-up; six on day 5 and two on day 14. Cord blood TSH values and the number of hypothyroidism cases within each group are provided in ***Table* I**. Congenital hypothyroidism was diagnosed in 8 cases.

Cord blood TSH was >20 mU/L in all samples, except one where it was 18 mU/L. One baby showed a goiter in radionuclide scanning, whereas maternal hypothyroidism was present in two infants, and maternal hyperthyroidism in one child. No specific cause was found in the other five babies.

A cord blood cut-off of 20 mU/L is considered reasonable but it might be prudent to rescreen babies with a cord blood TSH above 10, as one of our patients had a cord blood TSH of 18 mU/L. Taking a cord blood TSH of 10 mU/L as cut off, our false positivity was 20%. Results from this study population show a higher incidence of congenital hypothyroidism than that has been reported from other countries [3-5] or from other parts of India [1,6,7]. Increase in incidence within the same country over subsequent years also has been reported [8]. The incidence of primary hypothyroidism vary depending on dietary iodine sufficiency, laboratory methods of screening, different test cut-off values, and demographic, geographic, racial and ethnic factors. Social customs like consanguinity also alter the incidence [9]. Transient hypothyroidism also may contribute to varying prevalence [4]. Cord blood TSH provides a suitable first line diagnosis congenital hypothyroidism, especially when a 72-hour screen cannot be ensured. This study has limitations of being a hospital-based retrospective study.

TABLE I DISTRIBUTION OF HYPOTHYROIDISM CASES ACCORDING TO CORD BLOOD TSH LEVELS

Cord blood TSH (mU/L)	*No.*	*Hypothyroidism cases*
>100	3	3
90 -100	1	0
60-70	1	1
50-60	4	0
40-50	4	0
30-40	13	1
20-30	43	2
10-20	334	1
<10	1549	0

In view of higher incidence reported here, prospective studies on a larger population are needed to confirm the findings and elucidate the reasons for the increased incidence.

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Iodine Status among School Children of remote Hilly regions of Nepal

A cross-sectional study was conducted in remote hilly areas (Shree Antu and Ranke) of eastern Nepal to assess iodine status among school children aged 6-12 years. Urinary iodine excretion was estimated in 292 urine samples. The median urinary iodine excretion was 187.52 µg/L, and 33.6% children have insufficient urinary iodine excretion.

Keywords: *Iodine deficiency, Nepal, Urinary iodine excretion.*

People living in mountainous and hilly regions of Nepal have been found to be more iodine-deficient than those living in the plain regions. A national survey in 2007 showed that 18.9% school children were iodine-deficient in the eastern hills [1]. Considering the reported low iodine in soil of this region [2], and the frequent non-availability of iodized salts in remote hilly regions, we designed a cross-sectional study for assessing iodine status in school children of these regions.

We selected Shree Antu (Ilam) and Ranke (Panchthar) areas for sample collection after choosing Ilam and Panchthar as the representative hilly districts. Shree Antu and Ranke areas are at high altitude of 3400 meters and 2100 meters from sea level, respectively. Considering present iodine deficiency of 20% (approximate) in hills, we enrolled 292 school children (108 from 2 schools and a monastery of Shree Antu and 184 from 2 schools of Ranke) aged 6-12 years by random number generation using random number tables. We selected 6-12 years age children because of greater impact of iodine-deficiency on them, and their easy availability through schools. Consent was taken from guardian of children, and ethical clearance from Institute Review Board of B P Koirala Institute of Health Sciences (BPKIHS) in 2012. About 10 mL of urine samples were collected in clean plastic vials and transported to biochemistry laboratory of BPKIHS maintaining cold chain. UIE was estimated using ammonium persulphate digestion method [3].

The median UIE in our study was 187.52 µg/L (227.53 µg/L in Shree Antu and 175.45 µg/L in Ranke), which indicates adequate iodine nutrition among the children of hilly regions [4]. Median UIE among boys and girls was 205.66 µg/L and 150.84 µg/L, respectively. Median UIE was significantly different among genders (P=0.014) and among study areas (P=0.003). Iodine status on basis of UIE (WHO criteria) in the study areas and gender is shown in ***Table* I**, which shows 33.6% children had UIE<100 µg/L [4].

Nepal has been continuously improving in iodine nutrition [5]. The median UIE in our study was lower than in the study of Gelal, *et al*. [6], who has shown median UIE of 208.9 µg/L in hilly region. This suggests that improvement in median UIE is non-uniform within the