

## Letter To Editor

### Umbilical cord blood TSH : A predictor of congenital hypothyroidism

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Sir,

Newborn screening is the most modern public health preventive screening program involving the population at large and is mandatory in the USA, Europe, Japan and many South Asian countries. It is unfortunate that in India, newborn screening has not been given the attention it deserves. Neonatal hypothyroid screening using cord blood is an easy, practical & effective method. In most screening programs blood samples are collected at five to six days age, but with large number of babies being discharged early (usually the next day after a normal delivery and on the 3<sup>rd</sup> day after a caesarean section), cord blood sample is essentially indicated.

Congenital hypothyroidism (CH) is one of the most common causes of preventable mental retardation in children (1) and is due to thyroid hormone deficiency that the fetus is exposed to during pregnancy or the newborn after birth. Incidence reports prior to the advent of routine newborn screening showed figures of 1:7000-1:10,000 (2) but after the advent of screening, the incidence of congenital hypothyroidism worldwide has increased and that in India varies from 1:2500-2800 to 2.1:1000 live births (3, 4). Cord Thyroid Stimulating Hormone (TSH) is used as a screening tool for patients being discharged early from hospital after delivery (5). In most cases, the disorder is permanent and results from an abnormality in thyroid gland development (dysgenesis or agenesis) or a defect in thyroid hormonogenesis & hypothyroidism resulting from defects of TSH binding or signal transduction (6). Neonatal factors include, neonatal iodine deficiency or excess, congenital liver hemangiomas & mutations in the genes encoding for DUOX & DUOX<sub>2</sub> (7). In rare cases, CH may result from a pituitary or hypothalamic abnormality (central or secondary/tertiary hypothyroidism) (8).

The objective of this study was to study the cord

TSH values in newborns delivered at the Sree Narayana Institute of Medical Sciences, Chalakka, Ernakulam. Cord blood of all newborns, delivered, was sent for biochemical testing for TSH during the study period from 1<sup>st</sup> June 2011 to 31<sup>st</sup> August 2011. Antenatal consent for collecting umbilical cord blood for TSH was obtained before delivery by the investigator.

Blood sample drawn from the umbilical cord, cut at the time of birth of the baby was collected in a sterile container. Thus mixed cord blood sample including both from the umbilical artery and vein was obtained and sent for analysis. The Institutional ethics committee clearance was obtained before start of the project.

The following exclusion criteria were used: Birth weight <2.5 kg or Babies whose mothers were on any thyroid medications (Pro or anti thyroid) or H/o Fetal blood transfusions or Babies who required neonatal intensive care unit (NICU) care and unavailability of informed parental consent. TSH was estimated within 24 hrs by enzyme linked fluorescent assay using Mini Vidas, Bio Merieux, S.A., France and those newborns whose TSH values were in the abnormal range were recalled for a diagnostic test and evaluation.

Out of the 113 samples tested 79 (69.9%) were included and 34 (30.1%) had to be excluded as they did not meet the inclusion criteria set. Of the samples included 37 (46.8%) were males and 42 (53.2%) were females. The mean TSH value obtained was 9.47  $\mu$ U/L (SD 6.37) with a range from 2.24 to 41.32  $\mu$ U/L. TSH in 72.2% were in the normal range (< 10  $\mu$ U/L) 21 (26.6%) were in the indeterminate range (10-40  $\mu$ U/L) and 1 (1.2%) sample was in the hypothyroid range (>40  $\mu$ U/L). None of the children needed to be

started on thyroxin supplementation as the repeat TSH/TSH and T4 or confirmatory diagnostic tests were normal. On breaking up the results into values in the range of <10 µU/L, 10-20 µU/L, 20-30 µU/L, 30-40 µU/L and >40 µU/L we can see that the number of samples in the indeterminate range decrease with higher cut off values being used for screening.

Our study showed the mean TSH value to be 9.47 µU/L (SD 6.37) which was similar to that reported by Feleke et al in 2000 of 9.6±7.8 µU/L in 4206 newborns (9) as compared to 6.48 (SD 5.2) µU/L as reported by Mangalik AK, Chatterjee N and Ghosh G in 2005 (5). CH has been shown to have a 2:1 F: M (I) incidence while higher values have been reported amongst the males as compared to the females (5); though the TSH values obtained in our study amongst the males and females were highly similar. Our results showed that 26.6% of newborns screened had TSH higher than the cut off value for normal of 10 µU/L. This is much higher than that reported by Mangalik AK, Chatterjee N and Ghosh G in 2005 (5) who reported a rate of only 7.5% and that reported by Sanghvi U and Diwakar KK of 3.06% (3).

The recall rates for confirmatory testing have been varied while some studies from India have recalled babies with cord TSH values of more than 20 µU/L (5) others in Thailand have used value of 30 µU/L (10) with recall rates of 1.83% and 1.1% respectively with a further fall to 0.43 and 0.42% if the cut off were further raised to 40 µU/L. Our recall rate was higher than those mentioned in the above studies with a recall rate of 10.1%, 0% and 1.27% with cut off values above 20 µU/L, 30 and 40 µU/L respectively.

Congenital hypothyroidism should not be missed at birth by performing routine newborn screening. The best outcome occurs with L-thyroxine therapy started by 2 weeks of age at 9.5 µg/kg or more per day, compared with lower doses or later start of therapy (1). Residual defects can include impaired visuospatial processing and selective memory and sensorimotor defects. The emotional and financial burden on the family and society can be reduced if the treatment is initiated earlier. With early neonatal discharges from hospital, which is now the practice; the importance of cord TSH as a screening tool cannot be neglected.

**Joseph John<sup>1\*</sup>, Anumol Abraham<sup>2</sup> and Suchanda Sahu<sup>3</sup>**

Departments of Pediatrics<sup>1</sup>, Biochemistry<sup>3</sup> and MBBS Student<sup>2</sup>  
Sree Narayana Institute of Medical Sciences,  
Chalakkal, North Kuthiyathodu PO, Ernakulam – 683 594, India  
Email : drjj@rediffmail.com

## References

- Foley T, Kaplowitz PB, Kaye CI, Sundararajan S, Varma SK. Update on newborn screening and therapy for congenital hypothyroidism. *Pediatrics* 2006; 117: 2290–3303.
- Alm J, Larsson A, Zetterström R. Congenital hypothyroidism in Sweden. Incidence and age at diagnosis. *Acta Paediatr Scand* 1978; 67: 1–3.
- Sanghvi U, Diwakar KK. Universal newborn screening for congenital hypothyroidism. *Ind Pediatr* 2008; 45: 331–332.
- Desai MP, Bhatia V, Menon PSN. In: The thyroid gland. *Pediatric Endocrine Disorders*. 1st ed. New Delhi: Orient Longman; 2001: 183–202.
- Mangalik AK, Chatterjee N, Ghosh G. Umbilical cord blood TSH levels in term neonates: a screening tool for congenital hypothyroidism. *Ind Pediatr* 2005; 42: 1029–1032.
- Jain V, Agarwal R, Deorari AK, Paul VK. Congenital hypothyroidism. *Ind J Pediatr* 2008; 75: 363–367.
- La Franchi SH. Increasing incidence of congenital hypothyroidism: some answers, more questions. *J Clin Endocrinol Metab* 2011; 96: 2395–2397.
- Borck G, Topaloglu AK, Korsch E, Martiné U, Wildhardt G, Onenli-Mungan N et al. Four new cases of congenital secondary hypothyroidism due to a splice site mutation in the thyrotropin-beta gene: phenotypic variability and founder effect. *J Clin Endocrinol Metab* 2004; 89: 4136–4141.
- Feleke Y, Enquoselassie F, Deneke F, Abdulkadir J, Hawariat GW, Tilahun M et al. Neonatal congenital hypothyroidism screening in Addis Ababa, Ethiopia. *East Afr Med J* 2000; 77: 377–381.
- Mahachoklertwattana P, Phuapradit W, Siripoonya P, Charoenpol O, Thuvasethakul P, Rajatanavin R. Five-year thyrotropin screening for congenital hypothyroidism in Ramathibodi Hospital. *J Med Assoc Thai* 1999; 82: S27–S32.