



## Research Paper

# Association of Neonatal Hypothyroidism and Low Birth Weight & Pre Term Babies

Authors

**Indra.N<sup>1</sup>, Sreekala K.N<sup>2\*</sup>**

<sup>1</sup>Assistant Professor, Department of Physiology, Believers Church Medical College, Thiruvalla, Kerala

<sup>2</sup>Assistant Professor, Department of Physiology, SUT Academy of Medical Sciences, Trivandrum

\*Corresponding Author

**Sreekala K.N**

Assistant Professor, Department of Physiology, SUT Academy of Medical Sciences, Trivandrum

## **Background and Rationale**

Congenital hypothyroidism is the most common disorder identified by routine newborn screening. It is found in 1:3000 to 1:5000 screened infants (Dussault, 1993). The major clinical features of untreated congenital hypothyroidism are growth retardation and delayed cognitive development leading to mental deficiency. If treatment with pharmacologic doses of T4 is initiated early, growth and mental development are normal. Congenital hypothyroidism (CH) is the most common cause of preventable mental retardation in children. Thus screening programs of CH have been established for better management of the disorder and preventing its related neuro developmental consequences<sup>1</sup>.

The reported incidence rate of CH has significantly rise during past two decades. Suggested factors related to this high rate of CH occurrence are increased prevalence of CH and high rate of preterm infant births<sup>2,3</sup>.

Evidence from different screening programs indicated that the rate of CH was higher in pre-term and low-birth-weight (LBW) newborns than

normal ones due to insufficient development of hypothalamic pituitary axis.<sup>4</sup>Prevalence of this condition in very-low-birth-weight (VLBW) infants with birth weight of less than 1500 g has been approximately measured as 1 in 400 cases, which is significantly higher than its prevalence in full-term infants (1 in 4000 cases); however, only one-third of these infants can be diagnosed using the screening program.<sup>5,6</sup>There-fore, it is critical to screen CH in preterm infant, to pre-vent and minimize neuro developmental impairment. Some studies suggest that screening in VLBW newborns should be repeated, whereas others recommended other strategies, including lowering screening TSH cutoff and etc.

Congenital hypothyroidism is a relatively common congenital disorder in which the thyroid gland is deficient in development and function. It occurs in about 1 per 3500–4000 live births in North America, Europe, Japan, and Australia, with a range of 1–20 per 10,000 live births in different population groups, depending on genetic makeup and consanguinity rates. This genetic disorder affects females twice as often as males.

It causes an inefficient development of the thyroid and may be confused with iodine deficiency disorders common in areas with deficient iodine in water and soil. Therapy with thyroid replacement in congenital hypothyroidism cases prevents the severe intellectual impairment that otherwise occurs. Screening within 48 hours of birth should uncover cases for long-term follow-up and management and is a must for neonatal care globally.

Congenital hypothyroidism has many aetiologies. The most common cause is congenital thyroid dysplasia, present in approximately 1 in 6000 live births. There are rarer causes, including endemic deficiency of iodine, diminished responsiveness to thyrotrophin in familial goitre, and administration of antithyroid drugs to pregnant mothers

### **Diagnosis of Congenital Hypothyroidism**

Congenital hypothyroidism is detected on screening tests or otherwise on clinical grounds. A good clinical history and physical examination provide clues to the diagnosis. A high index of suspicion should exist where the infant comes from an area of known iodine deficiency. The only distinguishing clinical findings at birth which should prompt immediate testing of thyroid function are: large fontanelle, macrosomia and postmaturity, prolonged physiological jaundice

A history of somnolence, poor feeding and constipation are usually elicited after a positive test result. Family history for other cases of CH and history of maternal thyroid disorders are important for diagnostic evaluation

Physical examination should include careful palpation for a goitre with the neck hyper-extended. Care should be taken to examine for dysmorphic features and other organ anomalies.

### **Aim**

To find out the association of neonatal hypothyroidism with low birth weight and pre term babies.

### **Material and Methods**

**Study Design:** Cross sectional Study

**Sample Size:** 120

**Study Period:** May and June 2013

**Study Setting:** Sree Gokulam Medical College, Venjaramoodu, Trivandrum, Kerala

**Data Collection:** Data was collected from Medical Records of Sree Gokulam Medical College after getting permission from the authorities. Data of 120 neonates and their mothers were collected during the months of May and June 2013 using a proforma.

**Data Analysis:** Data was entered in Microsoft Excel and analysed in SPSS 19 version. Simple proportions calculated. Chi square values and levels of significance were found out.

### **Results**

19 (15.8%) out of 120 babies were Low Birth Weight babies (LBW). 33 mothers were having PIH (Pregnancy induced hypertension). Among the newborns 13(10.8%) were having high TSH (Thyroid stimulating hormone) values viz above 20 micro IU/L. Birth weight <2.5 kg was found to be a risk factor for neonatal hypothyroidism with a p value of 0.033.

25 (20.8%) out of 120 babies were pre term. 40 mothers were having GDM and 26 were having hypothyroidism. Among the newborns 13(10.8%) were having high TSH values viz above 20 micro IU/L. Gestational age < 37 weeks was found to be a risk factor for neonatal hypothyroidism with a p value of 0.028

### **Discussion**

Endocrinologists and pediatricians recommend diagnosing CH as soon as possible, and when the diagnosis of CH is definitive, they recommend starting the treatment as soon as possible, not later than age of four weeks. There-fore, it seems unwise to postpone the 2nd screening test to later than the 4th week, considering possible irreparable mental disorders.

Results of this study are

- Low Birth Weight babies are prone to develop hypothyroidism in the neonatal period
- Pre term babies are prone to develop hypothyroidism in the neonatal period

Thus according to this study low birth weight and preterm babies are more prone to have congenital hypothyroidism.

Currently, screening of CH is based on either evaluation of early TSH, evaluation of early T4 with a TSH follow-up, or evaluation of early TSH and early T4.

Recently Lee et al.,<sup>7</sup> Muhammad et al.<sup>8</sup> and also some earlier studies emphasized measuring of both TSH and T4 for CH screening especially in preterm neonates. Evidence indicated that the screening based on measuring only TSH levels, which was common in many countries, did not have the ability to diagnose transient hypothyroidism.

Screening in the first days of life seems to be the most important step in the approach to CH and replacement of related deficient hormones, thus preventing consequences that cannot be remedied.

**Keywords:** TSH- Thyroid stimulating hormone, CH – congenital hypothyroidism, LBW- Low birth weight, GDM- Gestational diabetes mellitus

#### References

1. Sharon E. Oberfield What's birth weight got to do with it? *The Journal of Pediatrics*, Volume 178, 2016, p. 3
2. Xiaoli Sun, Brigitte Lemyre, Xiaoqin Nan, JoAnn Harrold, Sherry L. Perkins, Sarah E. Lawrence, Nick Barrowman .Free thyroxine and thyroid-stimulating hormone reference intervals in very low birth weight infants at 3–6 weeks of life with the Beckman Coulter Unicel DxI 800 .*Clinical Biochemistry*, Volume 47, Issues 1–2, 2014, pp. 16-18
3. Irit Schushan-Eisen, Liora Lazar, Nofar Amitai, Joseph Meyerovitch. Thyroid Functions in Healthy Infants during the First Year of Life. *The Journal of Pediatrics*, Volume 170, 2016, pp. 120-125.e1
4. Murphy N, Hume R, van Toor H, Matthews TG, Ogston SA, Wu SY, et al. The hypothalamic pituitary thyroid axis in preterm infants; changes in the first 24 hours of postnatal life. *J Clin Endocrinol Metab* 2004;89:2824e31.
5. Hunter MK, Mandel SH, Sesser DE, Miyabira RS, Rien L, Skeels MR, et al. Follow-up of newborns with low thyroxine and non elevated thyroid-stimulating hormone-screening concentrations: results of the 20-year experience in the Northwest regional newborn screening program. *J Pediatr* 1998;132:70e4
6. Woo HC, Lizarda A, Tucker R, Mitchell ML, Vohr B, Oh W, et al. Congenital hypothyroidism with a delayed thyroid-stimulating hormone elevation in very premature infants: incidence and growth and developmental outcomes. *J Pediatr* 2011;158:538e42.
7. Lee JH, Kim SW, Jeon GW, Sin JB. Thyroid dysfunction in very low birth weight preterm infants. *Korean J Pediatr* 2015;58:224e9.
8. Muhammad Z, Irshad M. Comparison of serum TSH and T4 levels in preterm and term neonates for screening of congenital hypothyroidism. *J Med Sci (Peshawar)* 2013;21:194e7.