Editorial

Congenital Hypothyroidism : Need for National Health Policy

Congenital Hypothyroidism (CH) is caused due to insufficient production of thyroid hormone at birth[1]. It is one of the most common treatable causes of mental and growth retardation[2]. Neurodevelopmental outcome is normal if CH is diagnosed and managed within two weeks of birth. If left untreated, it may cause lifelong suffering as a result of mental retardation and growth deficiency. Clinical presentation of CH is usually subtle and most newborns with CH appear normal at birth because some amount of thyroid hormone is transferred from mother to baby during pregnancy. Maternal thyroid hormone provides protective effect and masks clinical features of CH in newborns. Common forms of CH also have some functioning residual thyroid tissue, making it more difficult to diagnose at birth. Within few weeks of birth, clinical signs and symptoms of CH become evident due to deficiency of thyroid hormone production. Delay in diagnosis and management of CH causes permanent neurologic damage[3]. There is an inverse relationship between age at clinical diagnosis of CH and Intelligent Quotient (IQ) score[4,5].

Newborn screening for CH is the most feasible and cost-effective way to detect CH at birth and to begin treatment immediately. It is one of the cornerstones of preventive medicine having proven benefits. Introduction of universal newborn screeninghas eliminated CH as a cause of mental retardation in developed nations[6]. However, it remains a problem in developing nations such as India where universal screening programs for detecting CH in newborns are not routinely implemented[2].

Epidemiology :

Globally, incidence of CH usually varies between 1 in 3000 to 1 in 4000 live births. Females are more likely to have CH than males. Infants with Down Syndrome are at increased risk of being born with CH[3]. Incidence rates vary due to differences in geography and ethnicity, iodine deficiency or type of screening methods used[2]. In India, the first newborn screening for CH was conducted in 1982 using cord blood Thyroid Stimulating Hormone (TSH) and then in 1984 using postnatal dried blood spot (DBS) T4. Prevalence was 1:2481 and 1:2804 respectively[7]. Studies also showed state-wise incidence to be 1:1985, 2.1:1000, 1.6:1000, 1:1700, and 1:1221in Hyderabad, Kochi, Chennai, Andhra Pradesh, and Uttar Pradesh, respectively[8].

Recent assessment by ICMR revealed a much higher incidence of congenital hypothyroidism all over India at 1 in 1172, particularly in south Indian population (1 in 727)[9].

Etiology :

CH may be primary due to thyroid gland dysfunction or secondary due to pituitary gland dysfunction. In primary hypothyroidism, there is deficiency of thyroid hormone at birth caused by abnormal thyroid gland development (thyroid dysgenesis) or disorder of thyroid hormone synthesis (thyroid dyshormonogenesis)[1]. Thyroid dysgenesis accounts for 85% of cases while thyroid dyshormonogenesis accounts for 15% of cases[3]. Secondary or central hypothyroidism at birth results from deficiency of thyroid stimulating hormone. It is usually associated with congenital hypopituitarism[1,3].

CH is further classified into permanent and transient CH. In permanent CH, there is permanent deficiency of thyroid hormone which requires life-long management. On the other hand, transient CH is characterized by temporary deficiency of thyroid hormone at birth, which slowly resolves with time[1].

Clinical Features :

CH goes undetected in many newborns because clinical features are not apparent at birth. Symptoms appear slowly and are often non-specific. This indicates the importance of universal newborn screening programs to ensure diagnosis and prompt management. Presence of goiter, prolonged jaundice, birth weight more than 90th percentile, delayed development, poor growth, poor feeding, hypothermia, bradycardia, large fontanelles, macroglossia and umbilical hernia are some symptoms of CH[1,3,6].

CH is associated with an increased risk of other congenital abnormalities or malformations, the commonest being cardiac defects. Other abnormalities may include hearing loss, genitourinary anomalies, interstitial lung disease, cleft palate, bifid epiglottis, spiky hair, neonatal diabetes, congenital glaucoma, and liver and kidney disorders[6].

Diagnosis : Universal Newborn Screening

Universal newborn screening is the most effective method for detecting CH at birth. This is followed in most of the developing world, which has helped reduce incidence of CH in these countries. In absence of newborn screening, diagnosis is delayed which causes poor prognosis. Complete diagnostic evaluation should include detection of CH by newborn screening, confirmation by repeat thyroid function test, and determination of underlying etiology by diagnostic studies[1,2].

Newborn screening is usually carried out between two and five days of life, before discharge from hospital. Specimens collected before 48 hours of life may give false positive results. On the other hand, screening very sick newborns or screening after blood transfusion may give false negative results. Blood sample from heel prick or cord blood sample is collected on filter paper and sent to central laboratory for initial TSH or initial T4 test, with a follow-up TSH test[3,6].

Diagnostic Criteria :

According to the Indian Society for Pediatric and Adolescent Endocrinology (ISPAE)[10],

- Every newborn should be screened using heel prick method ideally within 48 to 72 hours of birth.
- Newborns with TSH < 20 mIU/L for >48hours of birth or TSH <34 for sample taken between 24-48 hours of birth should be treated as normal.
- Newborns with TSH > 20 mIU/L at > 48 hours of birth or TSH >34 mIU/L for samples taken between 24 to 48 hours of age should be recalled for confirmation within 1 week (by 7-10 days of life).
- For screen TSH > 40 mIU/L, immediate recall for confirmatory venous T4/FT4 and TSH, and for milder elevation of screen TSH, a second screening TSH at 7 to 10 days of age, should be taken.
- Sick babies should be screened at least by 7 days of age.

Management :

According to Indian Academy of Pediatrics (IAP) standard treatment guideline 2022[11],

- As soon as diagnosis is made, treatment with levothyroxine should be started within first 2 weeks of life. Initial thyroxine dose is 10–15 μg/kg/day.
- Treatment is recommended for newborns with FT4 < 1.17 ng/dl or T4 < 10 μg/dl with the same dose.

- Newborns with high TSH > 20 at less than 2 weeks and TSH >10 at more than 2 weeks are to be treated.
- Newborns with low FT4 (1.1 ng/dl) or T4 (<8 µg/dl) with normal TSH and those with normal FT4/T4 with high TSH (>10 beyond 3 weeks) are to be treated.
- A single morning dose at the same time is to be taken every day on empty stomach by crushing with a spoon and mixing with few ml of breast milk.

Prognosis :

Timely diagnosis and management are essential for preventing long-term adverse outcomes due to CH. Universal newborn screening, along with repeated screening of high-risk infants, and diagnostic tests are required for appropriate diagnosis and management. Treatment with levothyroxine should be started within first two weeks of life to ensure normal thyroid function. Prognosis is excellent for newborns with CH when properly managed[6].

Conclusion :

Newborn screening program for CH must be established at national level in India in order to reduce morbidity by preventing mental retardation and physical disabilities. CH is easy to detect, and inexpensive to treat. Newborn screening programs should be aimed at detecting all cases as early as possible, with an acceptable cost-benefit ratio.

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