SHORT REPORT

Congenital hypothyroidism: Diagnosis and management of patients

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Abstract

Congenital hypothyroidism (CH) is a neonatal endocrine disease with an incidence of 1:2000 to 1:4000 worldwide. Much remains to be known about the nature of this specific condition and the effective treatment of less severely-affected babies. We retrospectively reviewed the data for patients who were diagnosed with congenital hypothyroidism. So for a total of fifteen patients medical record files were thoroughly evaluated. Three (20%) patients were diagnosed with congenital hypothyroidism alone while 12(80%) patients were diagnosed with other disorders along with congenital hypothyroidism but all received treatment for congenital hypothyroidism. A high percentage 6 (40%) of uncertain or unclear cases suggested new genetic aetiologies that still need to be explained. Such cases need further exploration especially less severely affected patients so to avoid complications. It may be useful to identify the genetic aetiology accurately for dyshormogenic, familial, or syndromic forms of CH.

Keywords: Congenital Hypothyroidism, Familial, Whole-exome sequencing, Syndrome, Less severe.

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Introduction

Congenital hypothyroidism (CH) is one of the most common endocrine disorders in infants; figures from western countries suggest an occurrence of congenital hypothyroidism of about 1 per 3000-4000.[1-3] CH can be prevented by way of carrier dectection, genetic counselling and prenatal diagnosis. Ideally, a neonate diagnosis of CH should be based on clinical, biochemical and genetic testing.[1,2] Internationally, substantial improvement has been made in detecting the genomic origins of CH. Knowing the genotypic-phenotypic association of thyroid tumour will allow molecular testing of the Pakistani population in the future.[4,5] Newborn CH screening genetic panels are so critical for start-up care in children with primary congenital hypothyroidism (CH) because they can have stable growth and development in a timely manner. CH can be classified based on the biochemical, genetic alterations. Based on aetiology we can divide CH into two main categories: (a) disorders of thyroid gland development (Group of dysembriogenesis or thyroid dysgenesis) or (b) defects in any of the steps of thyroid hormone synthesis (a group of dyshormonogenesis).[6,7]

The increased incidence of congenital hypothyroidism among neonates born to Asian mothers has given rise to our interest in CH research at tertiary care hospital in Pakistan, where the clinical and biochemical spectrum of congenital hypothyroidism has not been identified to plan genetic studies in future. The objective of current research is to determine frequency of congenital hypothyroid patients presented at tertiary care hospital of Islamabad, Pakistan during the last five years.

Methods

Retrospectively, we checked the data from the Shifa International Hospital Medical Records Office for patients diagnosed with congenital hypothyroidism. The period under evaluation was from 2013 to 2018 for the duration of six months from July 2018 to December 2018. Shifa Reference values were used. Data of twenty-one patients with congenital hypothyroidism was retrieved from medical record of in inpatient department (IPD), out of which three patients were from Falahee Foundation IPD (whose data was extracted from Falahee records), one patients' data could not be retrieved because their records were very old, files of two patients had no documented data about congenital hypothyroidism. So for a total of fifteen patients medical record files were thoroughly evaluated. Reference values which were used for the evaluation of congenital hypothyroidism included T4: Pre-pubertal: 0.73-1.77 Pubertal/Adult: 0.73-1.84 and TSH: 0.4-14mIU/L. Out of fifteen hypothyroid patients nine (60%) were female and six (40%) were male. Age of patients evaluated for congenital hypothyroidism ranging from 1 month to twenty-three years. Three (20%) patients were diagnosed with only congenital hypothyroidism while twelve (80%) patients were diagnosed with other disorders along with congenital hypothyroidism but all were getting treatment for congenital hypothyroidism (Table-1,3). Patients who had other problems in addition to congenital hypothyroidism

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Table-1: Distribution of results based on T4, TSH and Drugs Used (n=15).

Number of patients	TSH	T4	Patients	Total	%	Drugs
2	>100 (High) 0.5 (High)	2.66 (High) 12.40 (High)	2	15-Feb	0.13%	Yes (Thyroxin)
1	--	---	---	--	0.06%	No
2	11.7 (Normal) 14 (Normal)	0.77 (Normal) 16 (Normal)	2	15-Feb	0.13%	Yes (Thyroxin)
1	4.93(Normal)	---	1	15-Jan	0.06%	Yes (Thyroxin)
2	100,>100 (High)	0.40 (Low)	2	15-Feb	0.13%	Yes (Thyroxin)
1	31.47 (High)	---	1	15-Jan	0.06%	Yes (Thyroxin)
4	0.057 (Normal) 0.16 (Normal) 3.72 (Normal) (High) Deranged	2.38 (High) 16.06 (High) 5.64 (High) (High) Deranged	4	15-Apr	0.27%	Yes (Thyroxin)
1	----	----	----	----	0.06%	Yes (Thyroxin)
1	0.26 (Low)	----	1	15-Jan	0.06%	Yes (Thyroxin)

TSH- Thyroid Stimulating Hormone

Table-2: Distribution of diagnosis based on frequency and percentages (n=15).

Pt#	Diagnosis	Frequency	Percentage
1	T1DM,Hypothyroidism	1	6.7
2	Congenital, Hypothyroidism, Down's syndrome, Tricuspid Regurgitation, Small PDA	1	6.7
3	CSD, bleeding disorder	1	6.7
4	Hirschsprung's disease	1	6.7
5	Hypothyroidism	3	20
6	Hypothyroidism		
7	T1DM	1	6.7
8	1:Left inguinal hernia, 2: Hypothyroidism	1	6.7
9	Congenital obstructive hydrocephalus / congenital Hypothyroidism	1	6.7
10	Hypothyroidism		
11	Sepsis/AKI	1	6.7
12	Acute gastroenteritis, sepsis, prematurity	1	6.7
13	Postcholecystectomy syndrome	1	6.7
14	Thyroxin overdose, 2nd to treatment of Hypothyroidism	1	6.7
15	Hypothyroidism, repeated infections (Meningitis, Pneumonia)	1	6.7

Type 1 Diabetes mellitus (T1DM).

Table-3: Distribution of hypothyroidism plus other signs and symptoms based on frequency and percentages (n=15).

Hypothyroidism Plus	Frequency	Percent
Delayed development, Mental retardation	1	6.7
Developmental delay, height, weight	1	6.7
Oedema, Resp. distress	1	6.7
Feed intolerance, Hydrocephalus	1	6.7
Lethargic	1	6.7
Multinodular goitre, Menorrhagia, Anaemia, Vitamin D3 deficiency	1	6.7
Obese	1	6.7
Pedal Oedema Visual Disturbances, Emaciated, Esotropia	1	6.7

including mental retardation, developmental delay, type 1 Diabetes mellitus (T1DM), oedema, respiratory distress, feeding intolerance, hydrocephalus, lethargy, multinodular goitre, menorrhagia, anaemia, vitamin D3 deficiency, obesity, pedal oedema, visual disturbances, emaciated, esotropia. Of the 15 patients, 14 (93 percent) received thyroxine. One patient (7%) was later confirmed as Down's and not receiving treatment. High TSH with low T4 was identified in two (13%) of patients and both were diagnosed with congenital hypothyroidism and received thyroxine therapy. High TSH was reported in one (6 per cent) patient but no T4 results were reported. Normal TSH with High T4 was reported in four (27%) patients. Low TSH with no reported T4 values was reported in one (6 %) of

the patients. High T4 with a high TSH was reported in two (13%) patients. Two (13%) patients were reported with Normal T4 and TSH. Normal TSH was reported in one (6%) patient with a report of T4 not available. A high percentage 6 (40%) of unexplained or unclear cases suggested new genomic aetiologies that remain to be explained (Table-1).

Conclusion

Twelve (80%) patients were diagnosed with additional disorders along with congenital hypothyroidism. Despite regular visits and care to check weight, height, development and overall health, one case of mental retardation has been observed. In two instances developmental delay have been recorded. These cases need further investigation, particularly of the less severely affected patients, in order to avoid complications. It may be useful to accurately identify the genetic aetiology for dyshormogenic, familial, or syndromic forms of CH.

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