CONGENITAL HYPOTHYROIDISM IN PRETERM INFANTS: EXPERIENCE IN A SINGLE TERTIARY CENTER IN SOUTHERN THAILAND

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Background and aims: Preterm infants are at high risk to develop congenital hypothyroidism (CH) due to the immaturity of the hypothalamic-pituitary-thyroid axis, loss of iodine supply from the mother, and preterm health problems. In our institute, Songklanagarind Hospital, thyroid screening in preterm infants was implemented in 2010. We aimed to study the etiologies of CH in preterm infants admitted during 2010-2013.

Methods: The medical records of preterm infants who were diagnosed as CH as defined by TSH level at the time of thyroid screening >10 mU/L or free T4 level <1.00 ng/dL were retrospectively reviewed.

Results: There were 1,966 preterm infants. Of these, 52 cases (2.78%) were diagnosed with CH. The average TSH levels at the first screening (day 7-8) was 20.35 mU/L and the confirmatory test (day 16-20) was 13.98 mU/L. After thyroxine discontinuation for 8-10 weeks at 3 years of age, there were 12 patients (23.1%) who had TSH levels >10 mU/L and were diagnosed as permanent CH. Thyroid scintigraphy revealed ectopic thyroid in 2 patients (16.7%), thyroid hypoplasia in 1 patient (8.3%), normal thyroid in 7 patients (58.3%) and enlarged thyroid in 2 patients (16.7%). The 40 preterm infants who had normal thyroid function after thyroxine discontinuation for 2 years were diagnosed as transient CH.

Table 1. Demographic data in all patients (N = 52)

Characteristic	N = 52	Media n	Mean ± SD	Range
Male/Female	23/29	-	-	
Gestational age, weeks		32	32.0 ± 2.53	27-36
Birth weight, gm		1440	1449 ± 477	520-2740
Associated disorders, N (%)				
- Sepsis	23(44.2)			
- Respiratory distress syndrome	26 (50)			
- Ventilator-associated pneumonia	7 (13.5)			
- Necrotizing enterocolitis	14 (26.9)			
- Patent ductus arteriosus	10 (19.2)			
Initial investigations				
Age at first TSH screening, days		8	8.73 ± 3.88	3-14
TSH level, mU/L		20.35	20.85 ± 12.19	7.72-100
Age at second screening, days		18	17.55 ± 9.33	9-33
Free T ₄ level, ng/dL		1.39	1.45 ± 0.31	0.89-2.22
TSH level, mU/L		13.98	15.22 ± 5.14	7.38-36.08
Initial dosage of thyroxine, µg/kg/d		16	14.4 ± 2.65	10-50
At 3 years of age				
Duration of thyroxine treatment, months		35.1	33.0 ± 5.9	19.6-42.7
Interval from thyroxine discontinuation and thyroid function test done, weeks		7.4	7.7 ± 34.60	4-22.8
Free T ₄ level, ng/dL		1.36	1.37 ± 0.18	1.05-1.83
TSH level, mU/L		5.75	6.55 ± 4.13	0.51-19.25
Children with TSH >10 mU/L	12 (23.1)	-	-	-
Age At thyroid scan done, years	N = 12	3.41	3.21 ± 0.61	2.22-3.84
Final diagnosis, n (%)		-	-	
- Transient hypothyroidism	40 (76.9)	-	-	
- Persistent mild hypothyroidism	11 (21.2)	-	-	
- Persistent overt hypothyroidism	1 (1.9)	-	-	

Table 2. Details of the thyroid function test in 12 preterm infants with permanent congenital hypothyrodism

No	Sex	GA (wk)	BW (g)	First Screening		Second screening		After thyroxine discontinuation						Thyroid scan
				FT ₄	TSH	FT ₄	TSH	6-8 weeks		6 months		12 months		
								FT ₄	TSH	FT ₄	TSH	FT ₄	TSH	
1	F	32	2100	0.98	>100	0.40	>100	1.00	44.20	-	-	-	-	Ectopic
2	M	36	1250	1.01	40.0	0.90	20.20	1.53	19.25	-	-	-	-	Normal
3	F	31	1730	1.20	36.0	1.48	12.6	1.20	16.50	-	-	-	-	Ectopic
4	F	31	1460	1.10	20.3	1.44	20.3	1.36	7.20	1.22	8.85	1.37	10.4	Enlarged
5	F	31	1555	1.34	24.5	1.34	36.0	1.45	11.90	-	-	-	-	Normal
6	F	35	1575	ND	ND	1.00	17.8	1.45	10.50	-	-	-	-	Normal
7	M	34	1650	ND	ND	1.29	12.0	1.46	10.59	-	-	-	-	Normal
8	M	30	1060	ND	ND	1.42	17.9	1.15	15.10	-	-	-	-	Normal
9	M	35	1300	1.25	12.2	1.90	13.9	1.32	5.75	1.33	15.7	-	-	Normal
10	M	34	2740	0.78	7.78	1.01	17.3	1.17	8.48	1.10	9.98	1.16	10.2	Enlarged
11	M	29	760	0.85	24.2	1.30	23.0	1.21	12.10	-	-	-	-	Hypoplasia
12	F	30	1062	-	-	1.06	14.7	1.07	11.21	-	-	-	-	Normal

ND, not done (due to the severe and complicated illnesses more than 2 weeks after birth)

Table 3. Characteristics of preterm infants with the final diagnosis of transient and mild permanent congenital hypothyrodism

	Transient CH (N = 40)	Mild CH (N = 11)	P value
Initial investigations			
Age at TSH screening, days	9.2 ± 3.1	8.3 ± 4.7	0.78
TSH level, mU/L	15.31 ± 11.61	25.47 ± 11.52	0.17
Age at confirmation, days	19.0 ± 10.7	17.6 ± 8.9	0.98
Free T ₄ level, ng/dL	1.49 ± 0.33	1.27 ± 0.18	0.10
TSH level, mU/L	14.40 ± 4.07	18.21 ± 7.41	0.11
At 3 years of age			
FT ₄ after 6-8 wks discontinuation, ng/dL	1.38 ± 0.21	1.37 ± 0.13	0.95
TSH level after 6-8 wks discontinuation,	4.61 ± 1.74	11.15 ± 4.62	<0.001

Conclusion: CH is common in preterm infants: 23% permanent and 77% transient CH. Thyroid screening is crucial for early detection and treatment of patients with permanent CH to prevent longterm neurodevelopmental complications of untreated CH.