Study of Hearing Function in Children with Congenital Hypothyroidism attending Alexandria University Children's Hospital

Shaymaa Elsayed [1], Ehsan Wafa [1], Doaa Elmoazen [2], Haidy Elsayed [1]
[1] Pediatric Endocrinology and Diabetology Unit, Faculty of Medicine, Alexandria University, Egypt.
[2] Otorhinolaryngeology, Unit of Audiology, Faculty of Medicine, Alexandria University, Egypt.

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Introduction

• Congenital hypothyroidism (CH) is the most common congenital endocrine disorder in childhood and is one of the most common preventable causes of mental retardation.

• Thyroid hormones (TH) are essential for normal development of auditory system. Deficiency of TH results in various degree of congenital hearing impairments or even in deafness if treatment is not started within a critical time window.

• Hearing impairment in hypothyroidism can be Conductive or Sensorineural type. Thyroxine deficiency is responsible for the delay and abnormalities in the auditory brainstem response (ABR), so ABR is used in young children to estimate hearing level and monitor neural conduction.

Objectives

• To study the hearing function, frequency and type of hearing impairment among children with congenital hypothyroidism.

Methods

• The study was conducted on 41 Children with CH aged 3 years and more attending the Endocrinology clinic in Alexandria University Children's Hospital in Egypt.

• Thorough history and clinical examination were done with emphasis on age of diagnosis and start of treatment, and symptoms of hearing impairment. Thyroid functions were performed.

• Pure tone audiometer and acoustic impedance were done to evaluate the hearing and middle ear function.

Results

• 10 children (24.4%) had hearing impairment; their mean age was 7.8 years, they started treatment at the mean age of 5 months.

Distribution of cases according to the Demographic data

	Total (n = 41)		Cases				p
			With hearing loss (n = 10)		Normal (n = 31)		
	No.	%	No.	%	No.	%	
Total number of cases	**41**		**10**		**31**		
Total number of ears	**82**		**17**		**65**		
Sex							
Male	15	36.6	4	40.0	11	35.0	FEp=
Female	26	63.4	6	60.0	20	64.5	1.000
Age (years)							
Min. – Max.	3.20 – 16.30		3.50 – 14.40		3.20 – 16.30		0.129
Mean ± SD.	9.51 ±4.09		7.87 ±3.69		10.05 ±4.12		
Age of starting the treatment (months)							
Min. – Max.	0.25 – 24.0		0.25 – 16.0		0.25 – 24.0		0.891
Mean ± SD.	5.38 ±6.02		5.03 ±5.51		5.49 ±6.26		

• Four cases had bilateral Conductive hearing impairment (9.8%), three had bilateral SNHL (7.3%), and 3 had unilateral Conductive hearing impairment.

Distribution of the studied cases according to Hearing Assessment

	No. of cases (n = 41)	% of cases
Unilateral Conductive	**3**	**7.3**
RT conductive	2	4.9
LT conductive	1	2.4
Bilateral Conductive	**4**	**9.8**
Bilateral SNHL	**3**	**7.3**

• Most of the cases with hearing impairment had mild degrees by Pure tone audiometer.

Distribution of the studied cases according to the Degree of hearing loss using Mean PTA

Degree of hearing loss according to Mean PTA (Hz)	Total (n = 41)	
	No.	%
Right ear		
Normal (< 25)	32	78.0
Mild (25 - 40)	7	17.1
Moderate (41 - 55)	1	2.4
Moderate to severe (56 - 70)	1	2.4
Positive Rt ear cases (n=9)	**34.4 ± 10.15**	
Left ear		
Normal (< 25)	33	80.5
Mild (25 - 40)	7	17.1
Moderate (41 - 55)	0	0.0
Moderate to severe (56 - 70)	1	2.4
Positive left ear cases (n=8)	**33.87 ± 10.97**	

• Significant statistical **negative** correlation was present between mPTA and age, height and last FT4. Significant positive correlation was found between mPTA and symptoms score.

Correlation between Mean PTA and different parameters

	Mean PTA			
	Right		Left	
	r_s	p	r_s	p
Age (years)	**-0.430***	**0.005***	**-0.426***	**0.005***
Age of start treatment (months)	-0.071	0.657	-0.059	0.713
Height SD	-0.058	0.716	-0.168	0.295
Height	**-0.498***	**0.001***	**-0.465***	**0.002***
Initial TSH	-0.048	0.764	0.052	0.748
Last TSH	0.042	0.794	0.009	0.958
Initial FT4 level	-0.085	0.598	-0.131	0.416
Last FT4 level	**-0.312***	**0.047***	**-0.314***	**0.045***
Symptoms score	**0.636***	**<0.001***	**0.560***	**<0.001***
Dose at start of treatment	-0.111	0.491	0.001	0.995
Current Dose	0.149	0.353	0.288	0.068

Conclusions

• Early screening and treatment of hearing impairment in children with CH is important to prevent speech and language development problems.

References

• Bruno R, Aversa T, Catena M, Valenzise M, Lombardo F, De Luca F, et al. Even in the era of congenital hypothyroidism screening mild and subclinical sensorineural hearing loss remains a relatively common complication of severe congenital hypothyroidism. Hear Res. 2015; 327:43-7.

• Lichtenberger-Geslin L, Dos Santos S, Hassani Y, Ecosse E, Van Den Abbeele T, Leger J. Factors associated with hearing impairment in patients with congenital hypothyroidism treated since the neonatal period: a national population-based study. J Clin Endocrinol Metab. 2013;98(9):3644-52.

• Chou YH, Wang PJ. Auditory brainstem evoked potentials in early-treated congenital hypothyroidism. J Child Neurol. 2002;17(7):510-4.