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HYPOTHYROIDISM IN PEDIATRIC PATIENTS: MODE OF PRESENTATION AND TREATMENT OUTCOME

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ABSTRACT
The present study was conducted to determine the mode of presentation of hypothyroidism in pediatric patients and the effects of timing of diagnosis and therapy on the patient's outcome. The study involved review and evaluation of the medical records of 41 registered patients in the Endocrine clinic of Children Welfare Teaching Hospital in Baghdad during the period from January 1991 to July 2007. Forty one patients included in this study. Twenty four (58.5%) were males and17 (41.4%) were females with a male to female ratio of 1.4:1, their age range is 40 days to12.3 years. The majority of the studied patients were infants 19(47%). The most commonly observed presenting features were growth retardation and short stature. The best time for the detection and treatment of congenital hypothyroidism is the early few weeks of life.

KEYWORDS: pediatrics; neonatal screening; hypothyroidism; T4; growth retardation.

INTRODUCTION

Hypothyroidism results from deficient production of thyroid hormone or defect in receptor activity. It might manifest from birth when the symptoms appear after a period of apparently normal thyroid function, disorder might be truly acquired or may only appear so as a result of one of variety of congenital defects in which the manifestations of deficiency is delayed[1]. Thyroid hormone is essential to growth and neurologic development in childhood. The thyroid begins to take shape at 7 weeks gestation, and thyroid hormone (T4, thyroxine) is produced starting at 12 weeks gestation. Thyroid dysfunction in the neonate, infant, or child has a significant impact on development[2]. Most infants even with complete agenesis of the thyroid gland have no symptoms at birth that are explained by the transplacental passage of moderate amount of T4 which provides a fetal level 33% of normal. Breast milk contains significant amount of thyroid hormone mainly T3 which is inadequate to protect the breast fed infant with congenital hypothyroidism. Both transplacentally acquired T4 from the mother and T3 acquired from breast milk does not affect the screening program[3,4]. Hypothyroidism in pediatric age group is not rare. It is a treatable disease with severe consequences when untreated; hence it should be promptly diagnosed, a process facilitated worldwide by the application of neonatal screening [4,5]. Infants with modestly elevated screening positive TSH levels between 17 and 19.9mIU/L have a significant risk (24%) of having a Congenital Hypothyroidism. The very high frequency of true positive term newborn with initial TSH values more than or equal to 30mIU/L suggests that this group should be referred directly to a pediatric endocrinologist in an effort to expedite further assessment and treatment[6]. According to the American Academy of Pediatrics Guidelines, any infant with a low T4 concentration and TSH concentration greater than 40mU/L is considered to have primary hypothyroidism. Confirmatory serum testing should be performed to verify the diagnosis and treatment initiated immediately and before the results of confirmatory tests are available[7].

PATIENTS & METHODS

The medical records of the registered patients in the Endocrine clinic back to January 1991; in addition the medical records of all of the patients with hypothyroidism who were diagnosed (from the first of October 2006 to the first of July 2007) were reviewed making a collection of 41 patients 9 of them diagnosed recently and the remaining 32 patients were gathered from the Endocrine Clinic archives, they were followed up for an average of 50 months. Medical records were analysed in regards to age of presentation, clinical presentation, and timing of initiation of therapy and follow up of parameters of response.

RESULTS

The total number of the studied patient sample was forty one patients 24 (58.5%) of them were males and 17 (41.4%) were females, the male to female ratio was 1.4:1, the patients were in the age range between 40 days up to 12.3 years, there were 29(70.7%) patients of the total number retarded in their mile stones 17(41.4%) of them were males and 12 (29.2%) females. While only 12 (29.2%) patients manifested normal milestones, 5(12.1%) patients were males and 7(17%) patients were females. Goiter was observed in only 3(7.3%) patients, 2(4.8%) males and 1(2.4%) female and had never been the presenting complaint in any of them.

Table (1) showed the age and sex distribution of the studied patient sample. In this table the age group of up to 6 months, there were 16 (39%) patients, 7(17%) were

males and 9 (21.9%) were females. There were 3 (7.3%) patients in the age group between 7 months and one year all of them were males. In the age group of one to five years there were 11 (27%) patients of the total number 8 (19.5%) males and 3 (7.3%) females.

There were six (15%) patients between 6 and 9 years of age 4 (9.7%) males and 2 (4.8%) females. the remaining 5 (12.1%) patients were between 10 and13 years of age, 2(4.8%) were males and 3(7.3%) females. Table (2) illustrated the presenting features of the studied patient sample. It shows that 15 (36.5%) of the total presented with constipation 6 (14.6%) were males and 4 (9.7%) females. Growth retardation was the presenting feature of another 10 (24.3%) patients 5 (12.1%) of them were males and the other 5 (12.1%) were females. Short stature was the least observed presenting feature found in 6 (14.6%) patients, 4(9.7%) of them were males, the remaining 2 (4.8%) were females.

Table (3) and graph (1) demonstrate the height of the studied patients group represented in centiles of age and gender matched normal for every patient. They showed that for the age group of patients diagnosed below the age of one year was 15(36.5%) patients below the 3rd centile, 6(14.6%) patients between 3rd-50%centile while no one exceeded the 50% centile.

TABLE 1: Age and sex distribution

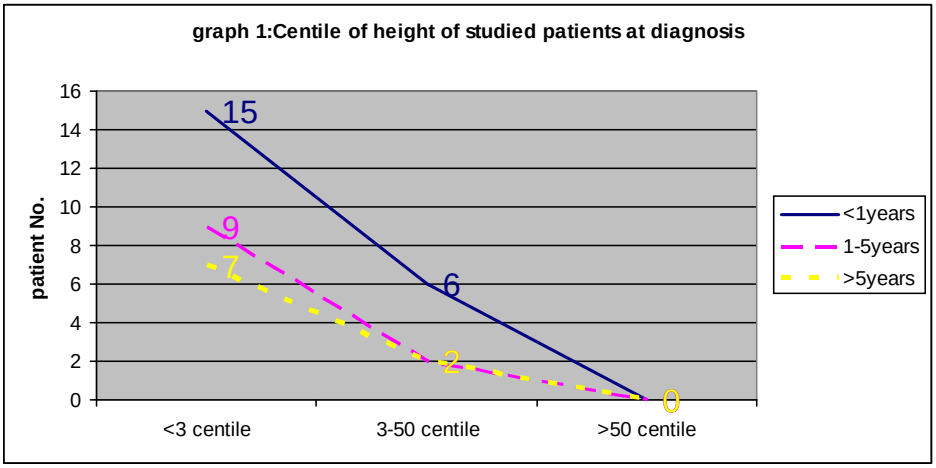
Age group	≤6 months		7-12 months		≤5 ≥1 years		6-9 years		≤13 ≥9 years	
gender	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
No.	7	9	3	0	8	3	4	2	2	3
%	17	21.9	7.3	0	19.5	7.3	9.7	4.8	4.8	7.3

TABLE 2: Presenting features of the studied patients

Presenting feature	number				total	%
	♂		♀			
	No.	%	No.	%		
Prolonged neonatal jaundice	9	21.9	6	14.6	15	36.5%
Constipation	6	14.6	4	9.7	10	24.3%
Growth retardation	5	12.1	5	12.1	10	24.3%
Short stature	4	9.7	2	4.8	6	14.6%

TABLE 3: Centile of height of studied patients at diagnosis

Centile	<1year		1-5years		>5years	
	No.	%	No.	%	No.	%
<3 centile	15	36.5	9	21.9	7	17
3-50 centile	6	14.6	2	4.8	2	4.8
>50 centile	0	0	0	0	0	0



For the age group 1-5 years 9(21.9%) patients were below the 3rd centile, 2(4.8%) were between 3rd and 50% centile while no one exceeded that range. Seven (17%) patients in the age group >5 years were below the 3rd centile, other 2(4.8%) patients were in the 3rd-50% centile group while no one exceeded the 50% centile.

Table (4) and graph (2**)** demonstrate height centile at the end of an average of 50 months of follow up, they demonstrate that for the age group less than 1 year there were 2(4.8%) patients left below the 3rdcentile despite treatment, 17(41.4%) patients catched the 3rd-50% centile range and other 2(4.8%) patients exceeded the 50% centile with treatment.

Table (5) and graph (3) showed the centile of weight of the studied patient patients sample at their initial diagnosis. They show that for the age group less than one year there were 18(43.9%) patients below the 3rdcentile, 3(7.3%) patients between 3rd and 50% centile and no one exceeded the 50% centile.

Table (6) and graph (4) refer to the centile of weight of the studied patient sample after an average of 50 months of follow up. They show that in the patient group below one year of age at diagnosis 3(7.3%) of patients remained below the 3rdcentile at the end of follow up,17(41.4%) in the patient group were in the range 3rd-50%centile of weight at the end of 50 months of treatment. For the patient group 1-5 years at diagnosis, there was one (2.4%) patient below 3rdcentile and 10(24.3%) patients in the 3rd-50%centile range but no one exceeded the 50% centile despite 50 months of treatment. All of the 9(21.9%) patients who were older than 5 years at diagnosis were 3rd-50%centile of weight at the end of the period of follow up.

TABLE 4: Centile of height of studied patients at end of 50 months of follow up

centile	<1year		1-5years		>5years	
	No.	%	No.	%	No.	%
<3 centile	2	4.8	4	9.7	1	2.4
3-50 centile	17	41.4	7	17	8	19.5
>50 centile	2	4.8	0	0	0	0

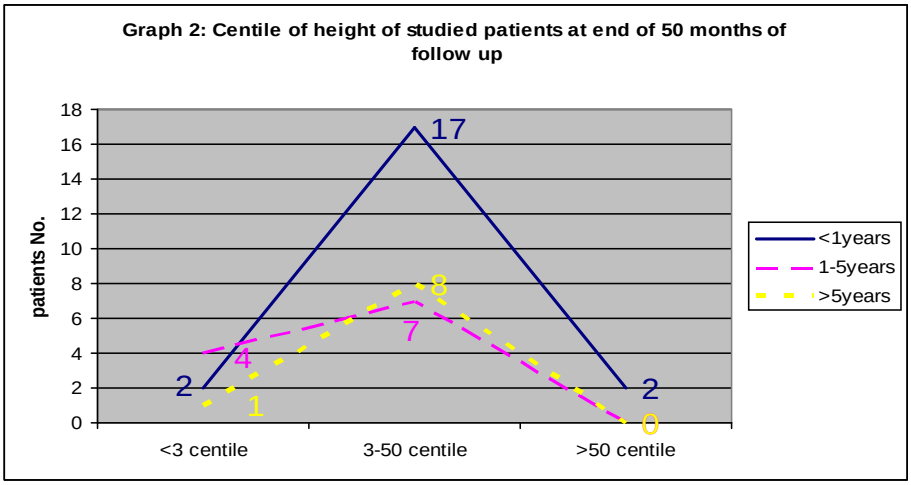


TABLE 5: Centile of weight of studied patients at diagnosis

centile	<1year		1-5years		>5years	
	No.	%	No.	%	No.	%
<3 centile	18	43.9%	7	17%	6	14.6%
3-50 centile	3	7.3%	4	9.7%	3	7.3%
>50 centile	0	0%	0	0%	0	0%

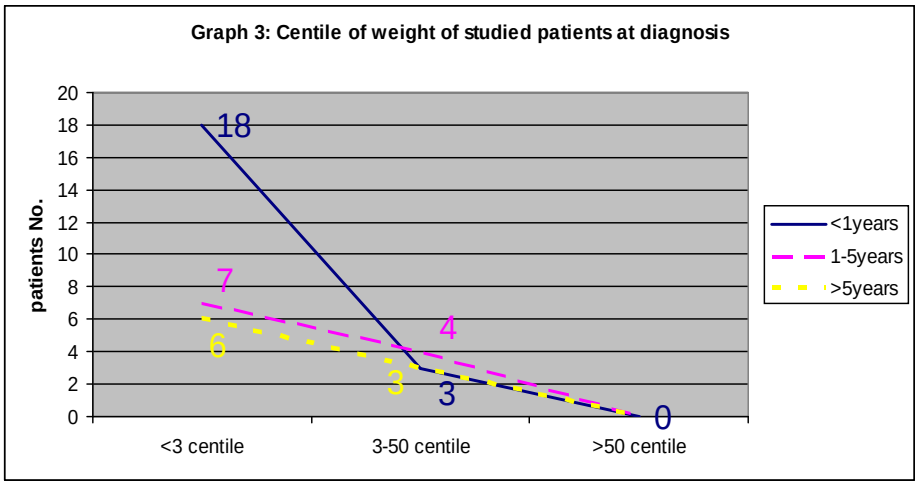


TABLE 6: Centile of weight of studied patients at end of 50 month of follow up

centile	<1year		1-5years		>5years	
	No.	%	No.	%	No.	%
<3 centile	3	7.3	1	2.4	0	0
3-50 centile	17	41.4	10	24.3	9	21.9
>50 centile	1	2.4	0	0	0	0

DISCUSSION

It is well known that thyroid hormone is important for physical and mental development and its deficiency will affect these parameters even with a good screening program applied in the developed countries[8]. In this study hypothyroidism distribution according to sex was male: female ratio of 1.4:1 in contrary to what was found by Hunter [9] that was 1:2.2 and Dr. Sailendra Kumar Yeluri who showed a ratio of 1:2 with a female predominance [10]. However, B. Karlsson[11] found male: female ratio of 1:1 comparable to this study. In this study the most commonly observed clinical presenting features were prolonged neonatal jaundice 15 (36.5%) and constipation 10 (24.3%) respectively, a finding similar to observation in another study[9]. A significant number of studied patients were suffering from developmental milestone retardation 29 (70.7%) an observational that is extremely different from a result obtained by R. Susan[12] who reported this observation in only 1% of her studied sample. Such discrepancy might be explained by the lack of screening program in the neonatal period for hypothyroidism in Iraq, on the other hand most cases included in this study occurred during the nineties of the last century when Iraq was under the international embargo imposed by the United Nations with consequent dysfunction of the health care system in Iraq which also lead to the late diagnosis and treatment that affect growth parameters of patients in this study where most of the patients were below the 3rd. centile in relation to height and weight 31patients (75.4%) for each with treatment most patients pooled between the 3rd. and 50 centile as shown in graphs No. 2 and 4. The best response to treatment was observed in the age group below one year which might be explained by their high growth potential.

CONCLUSION

1. Hypothyroidism is a disease with grave consequences in pediatric patients when untreated.
2. The best time for detecting and treating congenital hypothyroidism is the early few weeks of life.
3. Prolonged neonatal jaundice and constipation are the most common presenting clinical features in infants while short stature and growth retardation are the commonest among older age groups.
4. When early diagnosed and treated; children with hypothyroidism can achieve normal growth and development.

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