

Etiology of thyroid disorders in children: A cross sectional study in a tertiary care centre

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Abstract

Introduction: One of the most commonly encountered hormonal disturbances in the pediatric age group is thyroid dysfunction, out of which hypothyroidism the most common one. This study was done to assess the clinical and the etiology of thyroid disorder in children.

Materials and Methods: 118 children from the ages 0 to 15 with suggestive features of hypothyroidism such as prolonged jaundice of the newborn, features of cretinism, physical and mental growth retardation, obesity, constipation were included into the study. Apart from demographic and familial details, blood was collected for the detection of T3, T4 and TSH.

Results: There was a slight preponderance of females over males (1.4:1 ratio). Out of the total children included in the study, euthyroid was seen in 65.3%, 27.1% had hypothyroid and 7.6% had hyperthyroidism. Most of them (66%) were non goitrous hypothyroidism, where as 12% cases were hypothyroid with goiter. 2% were with goiter among the hyperthyroid cases and 20% without goiter. Out of the causes of thyroid disorders, the most common was acquired hypothyroidism in all the cases. Goitre was seen in 11 of the patients with euthyroid, 5 in patients with hypothyroid and in 1 patient with hyperthyroid.

Conclusion: Understanding the risk factors, signs and symptoms are very essential to prevent this condition. Education to the parents is also needed.

Keywords: Hypothyroidism, Hyperthyroidism, Thyroid dysfunction, Children.

Introduction

One of the most commonly encountered hormonal disturbances in the pediatric age group is thyroid dysfunction, out of which hypothyroidism the most common one. After diabetes mellitus, thyroid dysfunction is the most common endocrine disorder in the children throughout the world.¹

Thyroid hormones are responsible for the increase in oxygen consumption, stimulation of protein synthesis, carbohydrate, lipid as well as lipid metabolism, and also influence various other enzymatic activities and growth factor of the body. They have a vital importance in the brain development, where they promote cell growth and differentiation and induce the neurotransmitter function.² There deficiency causes a profound effect on the metabolism, growth and development.³

The thyroid dysfunction is usually age related, organ and tissue related. If the deficiency is during the early life or during the fetal stages, it can lead to irreparable damage including the neurocognition.² After the age of three years, since the brain development is complete, it can lead to stunted or slow growth and delayed skeletal maturation.⁴

The prevalence of the thyroid disorders range from region to region. It had been reported worldwide, while in India, Iran and Bangladesh, a higher prevalence has been observed.⁵ It has been reported that around 1.6 billion people of the world are at risk.⁶ In India, about 42 million people suffer from thyroid related diseases. The prevalence in children is estimated to be 0.07-1.7% and is steadily increasing.⁷

Hyperthyroidism occurs when the production of triiodothyronine (T3) and Thyroxine (T4) is in excess, while hypothyroidism is when these two levels are lower than required. One of the most common causes of thyroid

disorders in iodine deficiency.^{7,8} In 1983, India adopted the salt ionization program, there has been a steady decline of iodine related hypothyroidism.⁹⁻¹¹

This study was done to assess the clinical and the etiology of thyroid disorder in children.

Materials and Methods

This cross sectional hospital based study was done by the department of pediatrics at Fathima institute of medical sciences, Kadapa over a period of Between August 2016 to July 2019. This study was cleared by the Institutional Ethical Committee and Informed consent was obtained from the parents of all the patients after explaining the nature of study in detail to them. In the unavailability of the parent, the consent was given by the legal guardian. 118 children from the ages 0 to 15 with suggestive features of hypothyroidism such as prolonged jaundice of the newborn, features of cretinism, physical and mental growth retardation, obesity, constipation were included into the study. Patients who were already being treated for thyroid disorders were excluded from the study. Those who refused to give informed consent also were excluded from the study.

Detailed demographic data such as age, sex, height weight, BMI, salt intake per day, temperature, blood pressure, familial history of hypo or hyper thyroidism etc were taken. They were all subjected to thorough medical and clinical examination, and symptoms and clinical features were carefully noted. Examination of the thyroid gland was done and categorized according to the WHO guidelines.¹²

Thyroid profile which included Thyroid stimulating hormone (TSH), T4 and T3 was done for all the children. The Fasting blood cted by venous puncture and allowed to clot. The serum collected was tested for T3, T4 and TSH,

using ELISA. Complete blood picture, hemoglobin estimation was done for all the samples.

Results

118 children were suspected to have thyroid dysfunctions based on their clinical symptoms and conditions. There was

a slight preponderance of females over males (1.4:1 ratio). The most common age group to be affected was 1-3 years where 39 children were affected (33.1%), out of which 17 were boys (34.7%) and 22 were girls (31.9%). This was followed by 6-9 years 27 children (22.9%), out of which 12 (24.5%) were boys and 15 (21.7%) were girls. (Table 1)

Table 1: Gender and age wise distribution of patients

Age	Boys	Girls	Total
< 1 month	1(2%)	1(2%)	2(1.7%)
1-12 months	2(4.1%)	6(8.7%)	8(6.8%)
13-36 months	17(34.7%)	22(31.9%)	39(33.1%)
37-72 months	9(18.4%)	13(18.8%)	22(18.6%)
73-108 months	12(24.5%)	15(21.7%)	27(22.9%)
109-144 months	7(14.3%)	11(15.9%)	18(15.3%)
>144 months to 15 years	1(2%)	1(1.4%)	2(1.7%)
Total	49(41.5)	69(58.5%)	118(100%)

Out of the total children included in the study, euthyroid was seen in 77 (65.3%), 32 had hypothyroid (27.1%) and 9 had hyperthyroidism (7.6%). (Fig. 1)

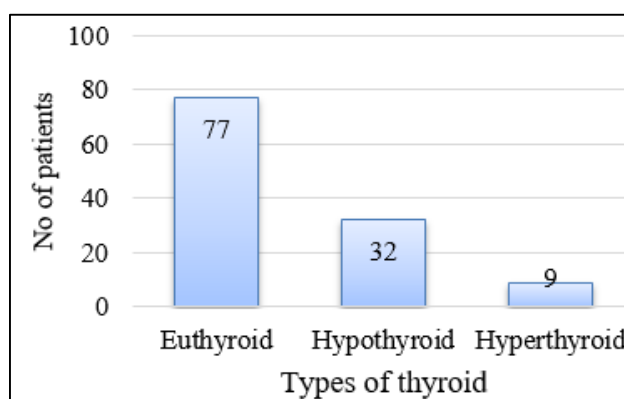


Fig 1: Classification of thyroid disorders among the patients

Out of the 41 cases of hypothyroid and hyperthyroid conditions, most of them (27) were non goitrous hypothyroidism (66%), where as 5 cases were hypothyroid with goiter (12%). Out of the 9 cases of hyperthyroid, 1 was with goiter (2%) and 8 were without goiter (20%). (Fig: 2)

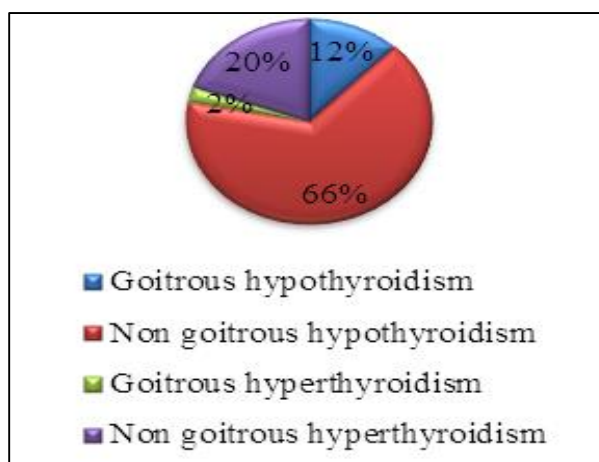


Fig 2: Types of hypothyroid and hyperthyroid

The most common symptom seen among the patients was lethargy in 28 children (23.7%), followed by pallor in 21 patients (17.8%). Dry skin was seen in 16 patients (13.6%) and constipation in 12 (10.2%). (Fig. 3)

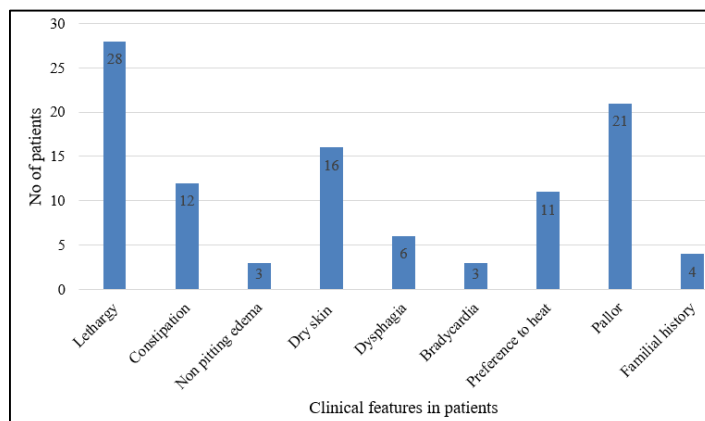


Fig 3: Clinical features

Out of the causes of thyroid disorders, the most common was acquired in all the cases. Goitre was seen in 11 of the patients with euthyroid, 5 in patients with hypothyroid and in 1 patient with hyperthyroid (Table 2).

Table 2: Causes of thyroid disorders

Disorder	Euthyroid	Hypothyroid	Hyperthyroid	Total
Goitre	11(9.3%)	5(4.2%)	1(0.8%)	17(14.4%)
Congenital	1(0.8%)	2(1.7%)	0(0)	3(2.5%)
Acquired	60(50.8%)	23(19.5%)	8(6.8%)	91(77.1%)
Autoimmune	5 (4.2%)	2(1.7%)	0(0)	7(5.9%)

Discussion

41 of the 118 cases who had symptoms of thyroid disorders had hypo or hyperthyroidism. Out of these, a higher female to male ratio was observed of 1.4:1. A similar observation was made in a study by Yelluri, where a 2:1 ration was observed.¹² Similar preponderance of females over males were seen in other similar studies by Kapil et al (2.9:1), Hunter et al (2.8:1) and Shah et al (3:1). Unnikrishnan et al, in a similar study in adults reported 54.7% of the patients to be females.¹³⁻¹⁶ In another study, 8:1 female to male ratio was observed.¹⁷ A study by Onyeruika et al reported a ratio pf 4:1, Ogbera and Kuku reported 5:1 ration in adults.^{7,18} However in a study by Jaja et al, 1.7 time more incidence was seen in males.¹⁹

Out of the 41 cases of hypothyroid and hyperthyroid conditions, most of them (27) were non goitrous hypothyroidism (66%), where as 5 cases were hypothyroid with goiter (12%). Out of the 9 cases of hyperthyroid, 1 was with goiter (2%) and 8 were without goiter (20%). A study by Desai (1997) reported out of 800 children with suspected thyroid disorders, 79% had hypothyroid, both goitrous and non goitrous, while only 19% of them had euthyroid goiters and 2% hyperthyroidism,⁴ 93% of hypothyroidism was reported by Singh et al.²⁰ Studies by Desai, Shah et al, Hunter et al and Marwaha et al also reported similar results which ranged from 2.5-10%.^{4,14,15,21}

In the present study, only 7.6% of the patients had hyperthyroidism. This was corroborated by a study by Singh et al, who reported an incidence of 6.1%.²⁰

The most common age group to be affected was 1-3 years where 33.1% of the children were affected followed

by 6-9 years with 22.9% affected. A prevalence of a higher age group was observed in a study by Onyeruika, where the mean age group was 11.2 years.⁷ Much earlier in 1979, Laditan noted the mean age group in children to be affected was 5.4 years.²²

The youngest patient to have hypothyroidism was 21 hours old, female. There were 2 children below the age of 1 month with hypothyroidism in the present study. A study by Oyenusi et al reported the youngest patient to be 7 hours.²³ All these children in our study had mothers with hypothyroidism.

In the present study, 66% of the 41 cases had non goitrous hypothyroidism, where 12% had hypothyroid with goiter. Out of the 9 cases of hyperthyroid, 1 was with goiter (2%) and 8 were without goiter (20%). This was similar to a study by Singh et al.²⁰

In the present study, goiter was seen in 14.4% of the cases out of which 9.3% were from euthyroid cases, 4.3% in patient with hypothyroid and 0.8% in patients with hyperthyroid. Most common cause was acquired seen in 78.8% of the cases. Around 65% of the cases were euthyroid. In a study by Yelluri et al,¹³ 58.3% of the cases were euthyroid as was seen with Shah et al with 56% of their cases.¹⁵ In a study by Singh et al, 10% of the patients were seen with goiter,²⁰ while Desai reported about 38% of children with goiter in thyroid related abnormalities.⁴

Congenital hypothyroidism was seen in 2 cases in the present study, amounting to 1.7%. However a very high incidence of congenital hypothyroidism was seen in many studies. A study by Oyenusi et al reported a 46.7%

incidence of congenital hypothyroidism in their study in Nigeria. In places where there is iodine deficiency, most of the reasons for thyroid dysfunctions are thyroid dysgenesis, ectopic thyroid or athyreosis.²⁴

Conclusion

In order to optimize development and growth of the children, it is important to identify the presence of thyroid disorders, early. Thus it is imperative to understand the risk factors, the signs and symptoms, the laboratory results and accurate diagnosis. The parents are also advised to recognize any abnormalities in the children and seek immediate care as thyroid disorders need long term care and therapy.

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Conflict of interest

None.

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