

## ORIGINAL ARTICLE

## EVALUATION OF THYROID DISEASES BY HORMONAL ANALYSIS IN PEDIATRIC AGE GROUP

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## ABSTRACT

**Introduction:** Among endocrine disorders commonly encountered in pediatric age group, thyroid diseases are more frequent. Congenital hypothyroidism is one of the major problems in this age with worldwide incidence of 1:3000-4000 live birth and in India it is 1:2500-2800.

**Objectives:** The aim of this study is to know the prevalence of thyroid diseases in newborn and children by hormonal evaluation.

**Methodology:** We have studied 50 children suspected of having signs and symptoms of thyroid diseases. Hormonal evaluation was done by the estimation of serum TSH, T3 and T4.

**Results:** Out of total 50 children, 16 were detected with abnormal hormone level and diagnosed having thyroid diseases. Out of 16 affected children, 4 had congenital hypothyroidism (25%), 6 had subclinical or acquired hypothyroidism (37.5%), 3 had autoimmune thyroiditis (18.75%) and 3 had goiter with graves disease (18.75%).

**Conclusion:** Congenital hypothyroidism is one of the major preventable thyroid disease if diagnosed early. Other thyroid diseases commonly seen in pediatric age are subclinical hypothyroidism, autoimmune thyroiditis, goiter and rarely hyperthyroidism.

**Keywords:** Pediatric age, newborn, congenital hypothyroidism (CH), subclinical hypothyroidism (SH)

## INTRODUCTION

In pediatric age group, thyroid hormones are primarily concerned with maintenance of growth, metabolism and mental development<sup>1,2</sup>. Thyroid hormones deficiency in infancy leads to irreversible impairment of neurocognitive function and physical and mental retardation<sup>2</sup>. Congenital hypothyroidism is the most preventable cause with worldwide incidence of

1:3000-4000. In India this ratio is 1:2500-2800<sup>1,2</sup>. Hypothyroidism after the age of three years when most of brain development is completed, their deficiencies leads to slow growth and delayed skeletal maturation<sup>2</sup>. Subclinical hypothyroidism (Normal total and free T4 & mildly elevated TSH) may progress to frank hypothyroidism over the period of several year<sup>3,4</sup>. Autoimmune thyroid diseases are now major leading cause of thyroid disorders in childhood and now considered the most common cause of acquired hypothyroidism. They include Hashimoto thyroiditis and lymphocytic thyroiditis. Their clinical manifestations range from euthyroid goiter to hypo or hyperthyroid state.<sup>5,6</sup>

Hyperthyroidism is rare in children and if present it cause rapid linear growth and skeletal growth

maturation due to increase metabolic activity<sup>3,5</sup>. Carcinoma of thyroid are very rare in this age<sup>3</sup>

## OBJECTIVES

Present study was undertaken with objectives to study the prevalence of various thyroid disorders in pediatric age group; to access hormonal status of infants and children in various thyroid disorders; and to differentiate various thyroid diseases by their hormonal estimation.

## MATERIAL AND METHOD

Subject cases:- Cases selected in this study were referred from pediatric department of Guru Gobind Singh Hospital, Jamnagar. The patients come with signs and symptoms of suspected thyroid diseases were referred and the provisional diagnosis was given by clinicians. Inclusion criteria for the referral are as follows.

a) Newborns with clinical signs suspecting of thyroid diseases; b) Children with clinical features suspecting of thyroid disorders like physical and mental growth retardation, obesity and constipation; c) Children having

thyroid gland enlargement but no clinical signs; and d) Children who were already diagnosed and on treatment.

All such patients were sent for hormonal estimations. Serum TSH, T3 and T4 estimations of all patients had been done.

#### Normal reference ranges for thyroid hormones levels were as follows.<sup>7</sup>

Serum TSH – 0.4 – 7 microIU/ml

Serum T3 - 0.5 – 1.9 ng/ml

Serum T4 – 5.5 -12.6 microgm/dl.

#### RESULTS:

Total 50 cases were studied. Demographic and clinical mistribution of the patients was shown in following tables.

Out of these 50 children 12 male children and 38 female children were included. Out of total 50 studied cases 16 patients were detected hormonally abnormal and diagnosed having thyroid diseases.

Male:female ratio in this study is 1:3.

**Table 1: Age wise distribution of cases**

Age of patient	Cases
New born( o-1 month)	6
1-12 months	3
1-2 yr	3
2-4 yr	10
4-6 yr	5
6-8 yr	8
8-10 yr	6
10-12 yr	8
12-14 yr	1

**Table 2: Sex wise distribution in 16 diagnosed cases**

Sex	Cases (%)
Male	4 (25.0)
Female	12 (75.0)
<b>Total</b>	<b>16 (100)</b>

**Table 3: Hormonal status of diagnosed 16 cases**

Hormonal status	Cases (%)
Euthyroid	9 (56.25)
Hypothyroid	6 (37.5)
Hyperthyroid	1 (6.25)
<b>Total</b>	<b>16 (100)</b>

**Table 4: Prevalence of Various thyroid disorders and their hormonal status in diagnosed 16 cases**

Thyroid disorder	Euthyroid	Hypothyroid	Hyperthyroid	Total
Congenital hypothyroidism	2	2	0	4
Acquired Hypothyroidism	4	2	0	6
Goiter including Graves disease.	1	1	1	3
Autoimmune Thyroiditis.	2	1	0	3
Thyroid Carcinoma.	0	0	0	0
<b>Total</b>	<b>9</b>	<b>6</b>	<b>1</b>	<b>16</b>

#### DISCUSSION

Fifty children suspected of having signs and symptoms of thyroid diseases were referred, their blood samples collected and thyroid hormone estimation (Serum TSH, Serum T3, Serum T4) as well as clinical correlation was done. The results were compared with previous studies of well known workers in this field and significant differences and similarities in various results were discussed below.

Study carried out by Ian Hunter et al<sup>8</sup> had shown Male:Female ratio 1:2.8

**Table 5: Male Fmale ratio in various studies**

Author	M:F ratio
Umesh Kapil (2)	1:2.9
Meena P Desai. (4)	1:3.4
Ian HUNTER (1)	1:2.8
Present study	1:3

Umesh kapil et al<sup>9</sup> had studied total 1254 children between age group of 6-12 years for the prevalence of Iodine Deficiency Disorders in children. M:F ratio in their study was 1:2.9. Meena Desai<sup>3</sup> had studied total 154 infant and children for the prevalence of congenital hypothyroidism and autoimmune thyroid disorder. M:F

ratio in her study was 1:3.4. In present study M : F ratio is 1:3 which can be better correlated with all above studies.

R.K. Marawah et al<sup>10</sup> had studied prevalence of thyroid diseases in children. In his study among diagnosed 122 children, 11.47 % male children and 83.52 % female children affected.

Meena P. Desai et al<sup>6</sup> had studied autoimmune thyroid diseases in childhood. Total 174 infant and children diagnosed by hormonal estimation and clinical presentation having thyroid diseases. Present study can be compared with their study.

Study carried out by Meena Desai shows prevalence of congenital hypothyroidism 46% while in present study it is 25% which is quite comaparable. Prevalence of ectopic thyroid was 11% while in present study it is 0%. This difference is due to large number of cases in Meena Desai study. Prevalence of thyrotoxicosis and autoimmune thyroid diseases in Meena Desai study were 2.75% and 40.25% respectively, while in present study it was 0% and 18.75 % which was not correlated. R.Pradhan et al<sup>11</sup> had studied prevalence of Iodine deficiency disorders in endemic Himalayan areas of India. Prevalence of goiter in their study was 25% in pediatric age group while it was 5% in present study.

**Table 6: Comparison of Prevalence of thyroid disorders**

Thyroid Diseases	Meena P. Desai <sup>6</sup> Cases (%)	Present study Cases (%)
Congenital Hypothyroidism.	71 (46%)	4(25)
Ectopic thyroid and dysmorphogenesis	17 (11.0%)	0
Thyrotoxicosis	4 (2.75%)	0
Thyroid carcinoma	0	0
Autoimmune thyroid diseases (Hashimotos and lymphocytic thyroiditis)	62 (40.25 %)	3 (18.75)
Acquired Hypothyroidism	0	6 (37.5)
Goiter with Graves disease	0	3(18.75)

**Table 7: Comparison of hormonal status with other studies**

Condition	Irfan M. Khurram et al: Cases (%)	Present study: Cases (%)
Hypothyroidism	109 (27.65)	6 (37.5%)
Euthyroidism	285 (72.35%)	9 (56.25%)
Hyperthyroidism	0	1 (6.25%)
<b>Total</b>	<b>394 (100%)</b>	<b>16 (100%)</b>

**Table 8: Comparison of hormonal status in various studies**

Condition	Meena P. Desai et al <sup>4</sup>	R K Marwah <sup>10</sup>	Present study
Euthyroid	13%	54.9%	56.25%
Hypothyroid	77%	42.6%	37.5%
Hyperthyroid	10%	2.5%	6.25%

**Table 9: signs & symptoms observed in other study**

Features	David W Smith et al <sup>13</sup>	Present study
Gestation age > 40 wk & birth wt.>4 kg	0/3	0/4
Large anterior frontanel	3/3	1/4
Respiratory distress.	3/3	0/4
Hypothermia. Temp. is 95F or less	2/3	2/4
Abdominal distention & vomiting	2/3	3/4
Icterus > 3 days.	3/3	2/4
Edema	3/3	2/4

Irfan M. Khurram et al<sup>12</sup> had studied 394 cases on clinical presentation of congenital hypothyroidism with hormonal estimation. Present study can be compare with the results of their study.

Study carried out by Irfan Khurram<sup>12</sup> shows hypothyroidism in 27.65% and euthyroidism in 72.55 % cases. While present study shows their prevalence in 37.5% and 56.25% cases respectively which is quite comparable. Hyperthyroidism was not detected in Irfan Khurram study due to selection of cases having only suspecting of congenital hypothyroidism.

Also hormonal status of cases of present study can be compare with Meena P. Desai and R K Marwah Study.

Thus from above data, present study is quite correlated with Meena P. Desai study, while better correlated with R.K. Marwah study.

David W Smith et al<sup>13</sup> had studied various signs and symptoms of congenital hypothyroidism in 15 children including infants.

Clinical signs and symptoms of present study can be compared with their findings.

Thus congenital hypothyroidism is commonly encountered and most preventable thyroid disease in newborn and children. Its early diagnosis can prevent physical and mental retardation.<sup>1,2,3</sup>

Follow up study of subclinical hypothyroidism can prevent its progress to overt disease. Mildly elevated TSH may either revert to normal or remain high due to resistance to TSH.<sup>4</sup>

Autoimmune thyroid disorders are now emerged as leading cause of thyroid disorder in pediatric age and this immunologically mediated diseases have genetic and familial predisposition. Hyperthyroidism and carcinoma of thyroid are very rare in children.<sup>5,6</sup>

## CONCLUSION

Thyroid hormones estimation is very useful in diagnosis and differential diagnosis of various thyroid disorders. The level of TSH is inversely proportional to level of T3 and T4. Increased level of TSH and Decreased level of T3 and T4 have been found in congenital and acquired hypothyroidism and in some cases of Goiter and autoimmune thyroiditis. Decreased level of TSH and increased level of T3 and T4 were found in thyrotoxicosis. Thyroid hormone estimation is also useful in monitoring of patients under treatment to know response to the treatment. Iodine deficiency disorders in infancy and early childhood affect normal growth and development. So early diagnosis by hormonal estimation is very useful and it can be established as a routine screening procedure.

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