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Original Research Article

CLINICAL PROFILE OF ACQUIRED HYPOTHYROIDISM IN CHILDREN: EXPERIENCE FROM A RURAL TERTIARY CENTER IN KARNATAKA

Nabanita Kora[1]

[1]*Assistant Professor, Department of Pediatrics, MVJ Medical College and Research Hospital, Bangalore, Karnataka, India*

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Corresponding Author:
Dr. Nabanita Kora,
Assistant Professor, Department of Pediatrics, MVJ Medical College and Research Hospital, Bangalore, Karnataka, India.
Email: nabanitacmc@gmail.com

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ABSTRACT

Background: Acquired hypothyroidism in the pediatric age group can adversely affect growth, pubertal development and scholastic performance. Despite its clinical significance, data on pediatric acquired hypothyroidism remain limited. This study aimed to assess the clinical and biochemical characteristics of affected children attending a rural tertiary care hospital in Karnataka.

Materials and Methods: A retrospective descriptive analysis was conducted on children aged 1–18 years with documented acquired hypothyroidism (both overt and subclinical) over three years. Clinical features, anthropometric data, family history and comorbidities were recorded. Thyroid function (FT4, TSH) and anti-TPO antibody levels were evaluated. Children with congenital hypothyroidism or transient TSH elevation were excluded.

Results: 56 children were included (mean age 11.8±4.7 years; 60.7% females). Overt hypothyroidism (OH) was present in 51.8%, subclinical hypothyroidism (SCH) in 48.2%. Mean age was higher in OH (13.1±4.0) than SCH (10.3±5.0) ($p = 0.021$). Tiredness (30.4%), goiter (26.8%), and short stature (23.2%) were common symptoms. Delayed puberty occurred exclusively in OH (20.7%, $p = 0.024$). Anti-TPO antibody positivity was higher in OH (58.6%) than SCH (29.6%) ($p = 0.035$). Family history of thyroid disease was significantly associated with OH (24.1% vs 0%, $p = 0.011$). Mean TSH and FT4 levels differed significantly between groups ($p<0.001$). Comorbidities included Type 1 diabetes (5.4%) and Down syndrome (3.6%).

Conclusion: Acquired hypothyroidism in children commonly presents with constitutional symptoms, goiter and growth retardation. Autoimmune thyroiditis appears to be the predominant cause, particularly among older girls and those with family history or autoimmune comorbidities. Early screening of at-risk children is essential for timely management.

Keywords: Acquired hypothyroidism; anti-TPO antibody; autoimmune thyroiditis.

INTRODUCTION

Thyroid hormones have important physiologic functions in most of the organs in the human body; it's crucial role in growth, physical and neurologic development, demands prompt diagnosis and proper treatment of hypothyroidism in infants and children.[1] Hypothyroidism is a common endocrine problem in children. Acquired hypothyroidism in children is more common than congenital hypothyroidism.[2] Hashimoto's thyroiditis, or chronic lymphocytic thyroiditis [CLT], is the leading cause of acquired hypothyroidism in both adults and children or adolescents.[3,4] While congenital hypothyroidism is well documented, data on acquired hypothyroidism in children—particularly in rural populations—remain scarce. This study aimed to describe the clinical and biochemical profile of acquired hypothyroidism among children attending a rural tertiary care center in Karnataka.

MATERIALS AND METHODS

This retrospective descriptive study was conducted in the Department of Pediatrics, in a rural Medical college and hospital in Karnataka. Children aged 1–18 years diagnosed with acquired hypothyroidism (subclinical or overt) over a three-year period (January 2023 to December 2025) were included. Cases with congenital thyroid defects were excluded by presence of symptoms since birth or early infancy as well as by doing USG thyroid scan. Transient TSH elevation as in sick and obese children were also excluded. Demographic, clinical, and biochemical data were retrieved from hospital records. That included details of age, gender, presenting complaints, family history of thyroid disorder or goiter, and presence of associated other autoimmune disorders and syndromes. Clinical examination included anthropometric measurements (height and weight), presence and grade of goiter (according to WHO classification), and pubertal staging (according to Tanner staging). Children with height less than the 3rd percentile for age and sex according to IAP-approved growth charts were classified as short stature. Those with weight more than the 95th percentile as per IAP BMI charts were classified as obese. Precocious puberty was considered for appearance of secondary sexual characteristics before 8 yrs in girls and 9 years in boys. Delayed puberty was stated as no appearance of secondary sexual characteristics by 13 years in girls and 14 years in boys. Both of these definitions were described by IAP. Menstrual irregularities in girls were counted as polymenorrhea, menorrhagia and metrorrhagia. Poor academic performance was considered as per parents' observations as well as deteriorating examination scores.

Thyroid function tests (FT4, TSH) and anti-TPO antibody assays were analyzed using standard automated platforms by chemiluminescence immunoassay. Overt hypothyroidism was defined as TSH >4.2 mIU/L with FT4 <0.8 ng/dL, and subclinical hypothyroidism as TSH >4.2 mIU/L with normal FT4 (0.8-1.9ng/dl).

Statistical analysis was performed using SPSS v21.0. Categorical variables were expressed as frequencies and percentages; continuous variables as mean ± SD. Chi-square, Fisher's exact, and independent t-tests were applied as appropriate, with $p < 0.05$ considered as significant.

RESULTS

In 3 years, total of 74 children were screened for thyroid disease, details given in Figure 1. 5 children had congenital hypothyroidism. 7 were obese children and 4 sick children, whose thyroid hormones were documented to return to normal values on reduction of weight and returning to normal health respectively. 2 children had abnormal thyroid hormones due chronic use of certain medications. 56 children met inclusion criteria.

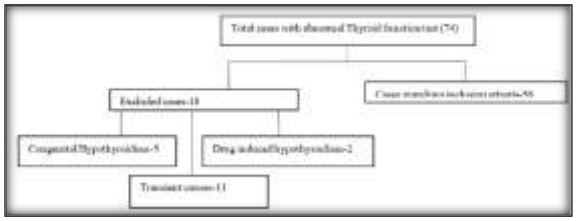

Figure 1: Flowchart for case selection for the study

The mean age of presentation was 11.75±4.7 years. 60.7% children were female. Overt hypothyroidism was found in 29 (51.8%) and subclinical hypothyroidism in 27 (48.2%). Children with OH were significantly older than those with SCH ($p = 0.021$). A family history of thyroid disease was seen in 12.5%, significantly associated with OH ($p = 0.011$). [Table 1] shows the age, sex and family history distribution between the two groups.

Table 1: Age, Sex and Family history Characteristics between the groups

Parameter	Overall (56)	OH (29, 51.8%)	SCH (27, 48.2%)	95% CI	Test statistic	P value
Mean age (years)±SD	11.75±4.7	13.14±4.01	10.26±5.04	Difference: 2.88 (0.45 to 5.31)	t=-2.376	0.021*
Gender distribution					χ^2=1.717	0.190
Male	22 (39.3%)	9 (31.0%)	13 (48.1%)	OH: 14.9-51.3%; SCH: 28.3-68.1%		
Female	34 (60.7%)	20 (69.0%)	14 (51.9%)	OH: 48.7-85.1%; SCH: 31.9-71.7%		
Family history of thyroid disease	7 (12.5%)	7 (24.1%)	0 (0%)	OH: 9.7-44.5%; SCH: 0-12.8%	Fisher's exact	0.011*

*Statistically significant

Common clinical manifestations included tiredness (30.4%), goiter (26.8%), short stature (23.2%), and menstrual irregularities in pubertal females (19.6%). Delayed puberty occurred only in the OH group (20.7%, $p = 0.024$). Constipation and weight gain were seen in 17.9% and 12.5%, respectively. 10.7% children had hair fall and 9% had poor scholastic performance. 1 child (1.7%) had excessive sweating as the chief complaint. 35 children (62.5%) had two or more than two symptoms at presentation. Table 2 gives the detail comparison of clinical features between the two groups.

Table 2: Comparison of Clinical Profiles in the groups

Clinical Feature	Overall (%)	OH (%)	95% CI for OH	SCH (%)	95% CI for SCH	Test statistic	P value
Tiredness	17 (30.4%)	10 (34.5%)	17.2-55.3%	7 (25.9%)	10.4-46.9%	χ^2=0.484	0.487
Goiter	15 (26.8%)	10 (34.5%)	17.2-55.3%	5 (18.5%)	6.3-38.1%	χ^2=1.817	0.178
Short stature	13 (23.2%)	9 (31.0%)	14.9-51.3%	4 (14.8%)	4.2-33.7%	χ^2=2.064	0.151
Menstrual Irregularity	11 (19.6%)	6 (20.7%)	7.8-39.7%	5 (18.5%)	6.3-38.1%	χ^2=0.042	0.838
Constipation	10 (17.9%)	6 (20.7%)	7.8-39.7%	4 (14.8%)	4.2-33.7%	χ^2=0.329	0.566
Weight gain	7 (12.5%)	5 (17.2%)	5.8-35.8%	2 (7.4%)	0.9-24.3%	χ^2=1.236	0.266
Hair fall	6 (10.7%)	4 (13.8%)	3.9-31.7%	2 (7.4%)	0.9-24.3%	χ^2=0.596	0.440
Delayed puberty	6 (10.7%)	6 (20.7%)	7.8-39.7%	0 (0%)	0-12.8%	Fisher's exact	0.024*
Poor performance in school	5 (8.9%)	4 (13.8%)	3.9-31.7%	1 (3.7%)	0.1-19.0%	Fisher's exact	0.353
Excessive sweating	1 (1.8%)	1 (3.4%)	0.1-17.8%	0 (0%)	0-12.8%	Fisher's exact	1.000

*Statistically significant

Mean TSH was significantly higher in OH (35.38±34.84 mIU/L) compared to SCH (6.88±2.07 mIU/L, $p < 0.001$). Mean FT4 was lower in OH (0.55±0.21 ng/dL) than SCH (1.22±0.20 ng/dL, $p < 0.001$). Anti-TPO antibody positivity was detected in 44.6% overall, significantly higher in OH (58.6%) than SCH (29.6%, $p = 0.035$). Table 3 shows the comparison of biochemical profiles between the two groups.

Table 3: Comparison of Biochemical Profile between the groups

Parameter	SCH	OH	95% CI	Test statistic	P value
Mean TSH (mIU/L) ±SD	6.88±2.07	35.38±34.84	Difference: 28.50 (15.52 to 41.48)	t=-4.397	<0.001*
Mean FT4 (ng/dL) ±SD	1.22±0.20	0.55±0.21	Difference: -0.67 (-0.78 to -0.56)	t=12.290	<0.001*
Anti-TPO positivity	8 (29.6%)	17 (58.6%)	SCH: 13.0-50.9%; OH: 38.6-76.5%	Fisher's exact	0.035*

*Statistically significant

Associated conditions included Type 1 diabetes mellitus (5.4%), Down syndrome (3.6%), and vitiligo (1.8%). In 1 child (1.7%), overgrowing Rathke's cleft cyst caused central cause for acquired hypothyroidism.

DISCUSSION

This study highlights the clinical spectrum of acquired hypothyroidism among children in a rural Indian setting. The female predominance and higher mean age in overt cases align with established literature,[5,6] reflecting the autoimmune nature of the disease. The mean age at presentation was significantly higher in the OH group compared to the SCH group, which is consistent with previous studies reporting that acquired juvenile hypothyroidism frequently presents between 9-11 years.[7,8] Hypothyroidism can manifestation as pseudo-precocious puberty, coagulopathy presenting as menorrhagia, hyperprolactinemia resulting in pubertal delay and secondary amenorrhoea.[9,10] We didn't get any child with precocious puberty but the exclusive presence of delayed puberty in overt hypothyroidism emphasizes the need for early recognition and treatment. The strong association between anti-TPO positivity, family history, and overt disease supports autoimmune thyroiditis as the leading etiology.[11-13] Percentage of short children were equal to another study from East India.[14] For long, obesity had been a known effect of hypothyroidism. This study showed quite a few (12.5%) children to have obesity, contrary to what was seen in another Indian study.[14] Hypothyroidism is known to cause menstrual irregularities in females.[15-17] But there is limited data of Indian adolescent girls affected with it. This study showed huge number of pubertal girls suffering from irregular periods due to an easily treatable cause. Like other few studies,[5,18] this study supports the screening of Anti TPO antibody in children with Downs syndrome and other autoimmune diseases. Few articles have reported hair fall due to hypothyroidism.[19,20] A good number of children (10.7%) were found to have hair fall in this study.

Limitations of the study: This study does not show treatment given for overt hypothyroidism or a long term follow up of subclinical hypothyroid children.

CONCLUSION

Acquired hypothyroidism in children commonly presents with constitutional symptoms, goiter, and growth retardation. Female gender, family history, and anti-TPO antibody positivity indicate a higher likelihood of overt autoimmune hypothyroidism. Subclinical hypothyroidism was found in large number of children. Regular screening of at-risk children, especially those with autoimmune disorders or pubertal delay or more than one hypothyroid symptom, is strongly recommended.

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