Clinical Etiological Pattern of Thyroid Disorders seen in Children and Adolescents in a City from Western India

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Abstract

Aim: Our study aimed to report the etiological pattern of thyroid disorders in children and adolescents clinically over a 2-year period.

Material and Methods: This was a retrospective descriptive study in which data were extracted from the case records of all the patients aged from birth to 15 years with thyroid disorders seen at the Dr. D. Y. Patil Medical College and Hospital, Pune for a period of two years.Relevant information such as age, duration of symptoms before presentation, presenting symptoms, investigation results, examination findings at presentation, family history of thyroid disorders andcomplications were extracted. Data extracted were recorded on a Microsoft 2010 Excel sheet and analyzed with SPSS software version 20.

Results: 45 patients were included in this study out of which, 15 were males and 30 were females with a ratio of 1: 3(M: F). The median age of presentation was observed to be 6.9 years. Congenital hypothyroidism was detected in 20 patients. About 25 patients were Juvenile, out of which Hashimoto disease was the most prevalent with 55% patients testing positive. The major presenting features were poor growth, followed by Prolonged jaundice and then developmental delay. The major clinical features were goiter, weight changes and short stature.

Conclusion: The above results emphasize that certain strategies with respect to the thyroid gland are required for the evaluation of the children as well as adolescents in order to detect its disorders in its initial stages.

Keywords: Etiological pattern, thyroid disorders, thyroid gland, Hypothyroidis

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Introduction

Thyroid disorders (TD) are among the most prevalent endocrine disorders on a national and international scale. According to data from numerous studies on TD, it is estimated that approximately 42 million Indians are diagnosed with them.[1]It is a spectrum of disorders characterized by under or overfunctioning of thyroid gland(TG), as indicated by the circulating levels of Tri-iodothyronin (T3), Thyroxin (T4), and Thyroid stimulating hormone (TSH). Thyroid hormone abnormalities may be caused by TG diseases themselves or hypothalamus or pituitary disorders.[2] The significance of thyroid hormones in maintaining physical growth, mental development and body metabolism in newborns and children is crucial. Thyroid hormones regulate nearly all components of normal child development, including myelination of the nervous system,

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dental and skeletal growth, growth and puberty, organ functioning and metabolism.[3]TD potentially can inflict irreparable and permanentdamage to nervous system as well as developmental delay, particularly in infancy, when the TG is underdeveloped and the child is exceptionally susceptible to the malfunctioning of the gland. In India, 1:2500-2800 live births are affected by congenital hypothyroidism(CH), making it the most prevalent preventable cause of mental retardation.[4,5] In later years, after complete neural development, hypothyroidism causes slowed growth and delayed maturation of bone.[5] However, hyperthyroidism is uncommonly seen in children.[5]It can boost metabolic activity, promoting accelerated skeletal growth and maturation.[6] Thyroid dysfunction can occur owing to gender, age, ethnicity, geography, and iodine consumption. Thus, the thyroid statistics of one population cannot be extended to another. Appropriate medical therapy for children with thyroid diseases involves understanding of thyroid ontogeny and childhood thyroid function, due to the lack of which, the aim of our retrospective study was to report the etiological pattern of thyroid disorders seen in children and adolescents clinically over a 2-year period at the Dr. D. Y. Patil Medical College and Hospital, Pune.It is anticipated that more people will become aware of the pediatric thyroid problems that exist in our community, which will make it easier to support rapid diagnosis and immediate treatment.

Materials and Methods

This was a retrospective descriptive study in which data wereextracted from the case records of all the patients aged frombirth to 15 years with thyroid disorders seen at the Dr. D. Y. Patil Medical College and Hospital, Punefor a period of two years. The Health Research and Ethics Committee of the Dr. D. Y. Patil Medical College and Hospital, Pune approved the study and waived the requirement for informed consent. A total of 45 patients diagnosed having thyroid disorders were included.

Study tools

Relevant information was retrieved, including age, presenting symptoms, duration of symptoms prior to presentation, investigation results, examination findings at presentation, complications, family history of thyroid diseases, and treatment. Clinical presentation, thyroid function tests (free thyroxine [FT4], free triiodothyronine [FT3], and serum thyroidstimulating hormone [TSH]), and radiological imaging were used to identify thyroid diseases. The received data were compiled in Microsoft Excel 2010 and analyzed using SPSS version 20.

Results

45 patients were included in this study out of which, 15 were males and 30 were females with a ratio of 1: 3(M: F). In our study, the youngest patient included was a 2day old infant that was born to a mother who had hypothyroidism. On basis of USG findings, the congenital group was further divided in which agenesis of gland was found in 5 children. Hypoplastic gland was present in 9 children. One case demonstrated transient hypothyroidism. Congenital hypothyroidism was detected in 20 patients out of which 13 patients were females and 7 were male, thus themale-to-female ratio seen was 1:1.8.(Table 1) One such case included a mother being treated for hypothyroidism. One was diagnosed at birth as a part of newborn screening whereas one was a gross delay casewhere congenital diagnosis was made at 13.9 years of age with hypoplastic thyroid. The median age of presentation wasobserved to be6.9 years.The other group included cases of thyroid disorders in the juvenile age group in which the male to female was 1:2.1. About 25 cases were Juvenile, out of which Hashimoto disease was the most prevalent with more than

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half of the total cases testing positive comprising of 10 females and 2 males.There were only two cases of Graves disease and central hypothyroidism each, with multiple anterior pituitary hormone deficiency with one of them having downs syndrome.

Table 1: Different groups of diagnosis of patients

Types	No. of cases	% Of cases
I Congenital	**20**	**44%**
Hypoplastic	9	20%
Absent	6	13.33%
Unknown cause/normal	4	8.89%
Transient	1	2.22%
Juvenile	**25**	**55.56%**
Graves	2	4.44%
Subacute or other	9	20%
Hashimoto	12	26.6%
Central	2	4.44%
Total	**45**	**100%**

In the current study, the major presenting features were poor growth, followed by Prolonged jaundice and then developmental delay. A single case of mct8 mutation was found. The major clinical features were goiter, weight changes and short stature. Subclinical thyroiditis was present associated with cervical lymphadenopathy. Only a single case of enlarged tongue was found.(Table 2, Graph 1)

Table 2: Presenting clinical features

Symptoms	No. of cases
Large tongue	1
Dry skin	2
Diarrhea/constipation	6
Periorbital puffiness	4
Gen swelling	3
Goitre	9
Wt loss/wt gain	5
Hernia	2
Anemia	2
Pseudoprecocious puberty	4
Prolonged jaundice	4
Abdominal distension	2
Excessive sleep	3
Developmental delay	7
Poor growth	14

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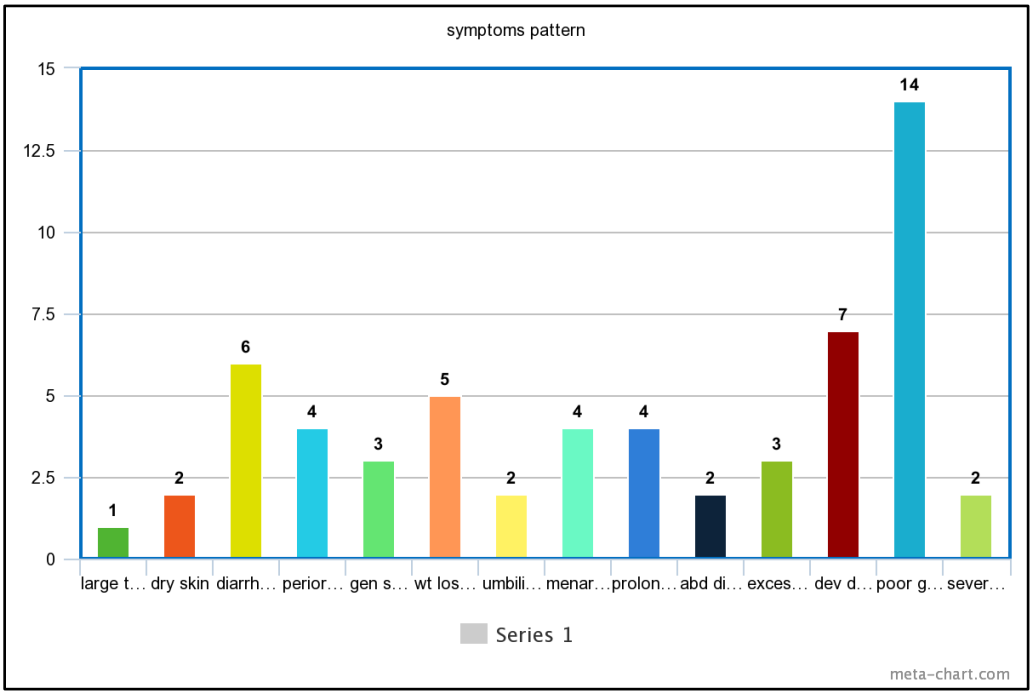

Graph 1: Presenting clinical features

Discussion

Although TD is among the most frequently diagnosed endocrine disorders in children, the exact etiology of these disorders is unknown.Hypothyroidism has a prevalence of 1%–2% in children.[7,8]Thus, collectively, thyroid disorders constitute a significant disease burden in children and adolescents.

Our study was retrospective in nature and included 45 patients out of which females were affected three times more than males. TD are more common in women of all ages, with a male-to-female ratio of 1: 2.9 to 1: 3.4 in Indian children[5,9,10] and Hunter et al reported it to be 1:2.8 among Scottish patients.[11]The most common TD reported out of CH and Juvenile Hypothyroidism was Juvenile with more than half of our cases. This is could bespecifically pertaining to our studyas the mean age of included patients was 6.9years. The most prevalent disorders for the juvenile group were found to be Hashimoto disease followed by Subacute hypothyroidism.

Hashimoto disease, an autoimmune disorder, is most frequently observed among all types of acquired hypothyroidism.[12]As a consequence of follicular rupture and the release of prepared hormones into the bloodstream, the course of the disease may begin with transient thyrotoxicosis (Hashitoxicosis). This condition might last for a short period of time. The presence of thyroid peroxidase and thyroglobulin autoantibodies in the circulation, in addition to the ultrasonographic appearance of the thyroid gland as an enlarged gland with diminished echogenicity, are both required for a diagnosis of this TD.[13]Our study also included a case of central hypothyroidism having Downs syndrome. Additionally, annual TD screenings for Hashimoto's disease should be performed more regularly in children with Down syndrome and Turner syndrome than in the general population.[14,15] In 2000, Marwaha et al tested 6283 schoolgirls from all over India for Hashimoto's disease and found that 1810 of the schoolgirls had goitre. He further conducted fine needle aspiration cytology(FNAC) on

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764patients, and 58 of them (or 7.5%) showed signs of juvenile autoimmune thyroiditis, with subclinical comprising of 15% subjects and overt hypothyroidism in 6.5% of the subjects.[16]

Our research detected Congenital hypothyroidism in 20 patients with a female predilection. Studies conducted in Mumbai have led researchers to the conclusion that CH is more prevalent in India than it is globally, with the condition affecting 1 out of every 2640 newborns, whereas the global average is 1 out of every 3800 people.[5] CH is frequently misdiagnosed in our country due to the frequent delays in performing diagnostic tests due to a lack of understanding of the condition, a unavailability of screening programmes or facilities, thus contributing to a lack of awareness about TD.

According to our study findings, the major clinical features were goiter, weight changes and short stature. In our study, only 20% of children with TD had goitre. This is slightly on the higher side of the researchpublished by Desai et. al. that concluded that 38% of children with TD had goitre which they explained could be possible due to area specific variations in the iodine deficiency.[5,10]

Iodine deficiency was also found to be associated to this condition by researchers from New Delhi, who demonstrated that this condition led to decompensated hypothyroidism in many patients. This resulted in the contribution of significant data from studies that have shown that iodine deficiency was linked to hypothyroidism in neonates, which gave rise to the salt iodization programme that was backed by the Government of India.[1]Following which, a reduction in CH was found in the prevalent areas of Uttar Pradesh from 100/1000 to 18/1000.[1]Children who have hypothyroidism may have difficulties in learning, bradycardia, intolerance to cold, constipation, face puffiness, small stature, and impaired bone growth. The clinical findings of the patients diagnosed with hypothyroidism were analogous to those of the Indian studies that have been reported in the past.[5,16-18] It was discovered that out of all, only 68.9% patients had used iodized salt in their cooking. In spite of the fact that this study did not analyse any samples of salt for iodine concentration due to unreported data, such a low rate of consuming iodized salt could be the cause of the hypothyroidism, which should be investigated further.[19]

Our study limitations were firstly, a small sample size. A bigger sample size will have a significant impact and deduce more clarity on the prevalence of TD. Secondly, our study only considered patients from the last two years to collect recent data but the range can be increased by a few more years. A comparison of serological tests function tests should also be made to strengthen its contribution to thyroid literature.The above results emphasizethat certain strategies with respect to the thyroid gland are requiredfor the evaluation of the children as well as adolescents in order to detect itsdisordersin its initial stages. Further workup for dyshormonogenesis, TCscan and anti thyroglobulin antibodies could not be done due to financial constraints.

Conclusion

Children commonly have TD. Newborn screening is encouraged in the country due to possible medical issues that can be avoided. Neonatal screening for CH promotes early intervention owing to negative consequences of TD on the rapid growth of the brain during childhood. In India, however, many cases of TD remain undiagnosed, impairing the developing brain. Congenital Hypothyroidism should be suspected by clinicians, especially in the cases of infants born from women suffering from TD.

Conflict of Interest: None

Funding: None

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