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PEDIATRIC GRAVES' DISEASE: CLINICAL FEATURES, THERAPEUTIC MANAGEMENT AND OUTCOMES IN A MOROCCAN COHORT

S. Kitani*, S. Amhager, H. Bella, H. Lachraf, A. Mdaghri Alaoui, Z. Imane

Pediatric Endocrinology Unit (P2), Children's Hospital, Ibn Sina University Hospital, Mohammed V University, Rabat, Morocco.

***Corresponding Author: S. Kitani**
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ABSTRACT

Background: Graves' disease is the most common cause of hyperthyroidism in children and adolescents. Despite its rarity in the pediatric population, it remains a significant clinical challenge because of its variable presentation, prolonged treatment course, and high relapse rates. **Objective:** To describe the epidemiological, clinical, biochemical, therapeutic, and outcome characteristics of children diagnosed with Graves' disease in a tertiary pediatric endocrinology center. **Methods:** We conducted a retrospective descriptive study in the Pediatric Endocrinology Unit of the Children's Hospital of Rabat, Morocco. Medical records of patients younger than 18 years diagnosed with Graves' disease between January 2020 and December 2024 were reviewed. Demographic, clinical, biochemical, radiological, therapeutic, and follow-up data were retrospectively collected and analyzed using descriptive statistical methods. **Results:** Fifteen children were included. The mean age at diagnosis was 11.3 years (range: 3–17 years). Females predominated, accounting for 86.7% of cases (female-to-male ratio: 6.5:1). Down syndrome was identified in two patients (13.3%), whereas a family history of thyroid disease was reported in 40.0% of cases. Goiter was present in all patients. Tachycardia was observed in 86.7%, exophthalmos in 46.7%, weight loss in 33.3%, behavioral disturbances in 33.3%, tremor in 26.7%, diarrhea in 20%, hyperhidrosis in 13.3%, and asthenia in 13.3%. All patients exhibited biochemical hyperthyroidism with suppressed TSH levels and elevated thyroid hormone concentrations. Thyroid ultrasound revealed diffuse goiter in all patients, with hypervascularization in seven cases. All patients received carbimazole therapy. Beta-blockers were prescribed in six patients. Thyroidectomy was performed in three patients and radioiodine therapy in two patients. Clinical and biochemical euthyroidism was achieved in six patients (40%) after a mean duration of 4.2 months. **Conclusion:** Pediatric Graves' disease is a rare autoimmune disorder predominantly affecting adolescent girls and remains the leading cause of hyperthyroidism in childhood. Antithyroid drugs remain the cornerstone of treatment, although definitive therapies may be required in refractory cases.

KEYWORDS: Graves' disease; Hyperthyroidism; Children; Carbimazole; Pediatric endocrinology.

INTRODUCTION

Graves' disease (GD) is an autoimmune thyroid disorder caused by stimulating antibodies directed against the thyrotropin receptor (TSHR), leading to excessive thyroid hormone production. Although it represents the most common cause of hyperthyroidism in childhood, it remains a relatively rare condition.

The incidence of Graves' disease in children is estimated at 0.1 per 100,000 children before the age of four years and increases to approximately 3 per 100,000 adolescents. The disease predominantly affects girls, particularly during puberty.

Clinical manifestations in children are often similar to those observed in adults, including goiter, tachycardia, weight loss, behavioral changes, and ophthalmopathy. However, pediatric patients may experience significant effects on growth, pubertal development, and psychosocial well-being.

The optimal management of Graves' disease in children remains controversial. Antithyroid drugs (ATDs) are generally considered first-line therapy, while surgery and radioactive iodine therapy are reserved for selected cases.

Data regarding pediatric Graves' disease in North Africa remain scarce. Therefore, this study aimed to describe the demographic characteristics, clinical presentation, biochemical profile, therapeutic management, and outcomes of children diagnosed with Graves' disease in a tertiary referral center in Morocco.

MATERIALS AND METHODS

Study Design and Setting

This retrospective descriptive study was conducted in the Pediatric Endocrinology Unit (P2) of the Children's Hospital, Ibn Sina University Hospital, Rabat, Morocco.

Study Population

Children younger than 18 years diagnosed with Graves' disease between January 2020 and December 2024 were included.

Diagnosis was based on clinical signs of thyrotoxicosis, suppressed serum TSH, elevated FT4 and/or FT3 levels, positive TSH receptor antibodies (TRAb), and compatible thyroid ultrasound findings.

Data Collection

Demographic, clinical, laboratory, ultrasound, therapeutic, and outcome data were extracted from medical records.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics version 26. Continuous variables were expressed as means ± standard deviations (SD) and categorical variables as frequencies and percentages.

RESULTS

Demographic Characteristics

A total of 15 children were included. The mean age at diagnosis was 11.3 years (range: 3–17 years). Females accounted for 86.7% of patients.

Table 1: Baseline Characteristics.

Variable	Value
Number of patients	15
Mean age	11.3 years
Age range	3–17 years
Female sex	13 (86.7%)
Male sex	2 (13.3%)
Family history of thyroid disease	6 (40.0%)
Down syndrome	2 (13.3%)

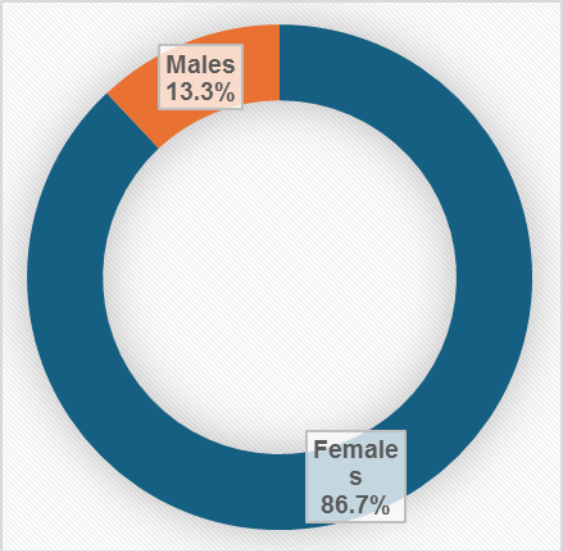

Figure 1: Sex Distribution of the Study Population.

Figure 1. Sex distribution of the study population. Females represented 86.7% (13/15) of the patients, whereas males accounted for 13.3% (2/15), resulting in a female-to-male ratio of 6.5:1.

Clinical Presentation

Goiter was present in all patients. Tachycardia and exophthalmos were among the most frequent manifestations.

Table 2: Clinical Manifestations.

Sign	n (%)
Goiter	15 (100.0)
Tachycardia	13 (86.7)
Exophthalmos	7 (46.7)
Weight loss	5 (33.3)
Behavioral disturbances	5 (33.3)
Tremor	4 (26.7)
Diarrhea	3 (20.0)
Hyperhidrosis	2 (13.3)
Asthenia	2 (13.3)
Thermophobia	2 (13.3)

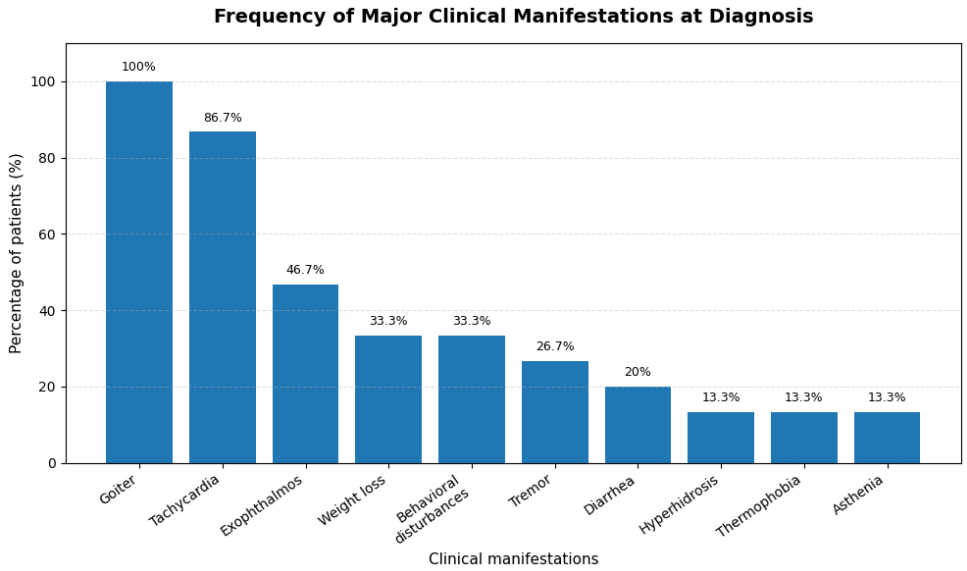

Figure 2. Frequency of major clinical manifestations at diagnosis. Goiter was present in all patients (100%), followed by tachycardia (86.7%), exophthalmos (46.7%), weight loss (33.3%), behavioral disturbances (33.3%), tremor (26.7%), diarrhea (20.0%), hyperhidrosis (13.3%), thermophobia (13.3%), and asthenia (13.3%).

Laboratory Findings

All patients presented with biochemical hyperthyroidism characterized by suppressed TSH levels and elevated thyroid hormone concentrations.

TSH receptor antibodies (TRAb) and anti-thyroid peroxidase (anti-TPO) antibodies were positive in all tested patients (n = 15). These findings further supported the autoimmune nature of Graves' disease in our cohort.

Thyroid Ultrasound Findings

Diffuse thyroid enlargement was observed in all patients.

Table 3: Thyroid Ultrasound Findings.

Finding	n
Diffuse goiter	15
Homogeneous gland	7
Hypervascularization	7
Pseudonodular thyroiditis	3
Cervical lymphadenopathy	1

Treatment and Outcomes

All patients received carbimazole as first-line therapy. Beta-blockers were prescribed in six patients. Thyroidectomy was performed in three patients and radioiodine therapy in two patients. Definitive treatment was performed in selected patients with persistent or refractory disease.

Clinical and biochemical euthyroidism was achieved in six patients (40%) after a mean duration of 4.2 months. Hypothyroidism developed in four patients (26.7%) after a mean duration of seven months, requiring treatment adjustment. Definitive treatment was necessary in selected patients, including thyroidectomy in three cases (20%) and radioiodine therapy in two cases (13.3%).

Table 4: Treatment Modalities.

Treatment	n (%)
Carbimazole	15 (100.0)
Beta-blockers	6 (40.0)
Surgery	3 (20.0)
Radioiodine therapy	2 (13.3)

DISCUSSION

Our findings confirm the female predominance and adolescent peak incidence consistently reported in the literature.

Similar to previous pediatric series, our cohort demonstrated a marked female predominance and a peak incidence during adolescence. Léger et al. reported a female-to-male ratio ranging from 4:1 to 6:1, consistent with our findings.

Goiter was present in all patients and represented the most common clinical manifestation. Tachycardia and ophthalmopathy were the second and third most frequent findings, respectively. These results are in agreement with previous pediatric studies.

The high frequency of tachycardia and ophthalmopathy observed in our cohort may reflect delayed diagnosis frequently encountered in pediatric Graves' disease.

The universal presence of suppressed TSH and elevated thyroid hormones confirms the diagnostic value of biochemical assessment. Likewise, TRAb positivity remains the most specific marker of Graves' disease.

Antithyroid drugs remain the cornerstone of management in children. Nevertheless, remission rates remain lower than in adults, explaining the need for definitive treatments in selected patients.

Definitive treatment was required in a minority of patients. Clinical and biochemical euthyroidism was achieved in 40% of patients during follow-up, highlighting the effectiveness of antithyroid drug therapy in a substantial proportion of cases. Thyroidectomy was performed in three cases, while radioiodine therapy was administered in two patients.

Our findings are broadly consistent with previously published pediatric series and support current international recommendations advocating antithyroid drugs as first-line therapy in children with Graves' disease.

STUDY LIMITATIONS

This study has several limitations, including its retrospective design, the relatively small sample size, and the single-center setting. Nevertheless, it provides valuable data regarding pediatric Graves' disease in Morocco, where published data remain limited.

CONCLUSION

Graves' disease remains a rare but important cause of pediatric hyperthyroidism. It predominantly affects girls and is characterized by goiter, thyrotoxicosis, and positive thyroid autoantibodies. Antithyroid drugs remain the first-line treatment, although surgery and radioiodine therapy may be required in selected refractory cases. Larger multicenter studies are needed to optimize therapeutic strategies and improve long-term outcomes.

ETHICS STATEMENT

The study was conducted in accordance with the principles of the Declaration of Helsinki. Patient confidentiality was strictly respected, and all data were anonymized prior to analysis.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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This research received no external funding.

AUTHOR CONTRIBUTIONS

All authors contributed to the study conception, data collection, manuscript preparation, critical revision of the manuscript, and final approval of the submitted version.

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