

2nd Edition of International Summit on **Diabetes, Endocrinology and Metabolic Disorders** July 21-22, 2026 | Vienna, Austria



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Elevated Frontal QRS-T Angle as a Predictor of Cardiovascular Risk in Graves' Disease: A Comparative Study

Background

Graves' disease (GD) is a common cause of hyperthyroidism and is frequently complicated by cardiovascular dysfunction. However, reliable, non-invasive markers for early cardiovascular risk stratification in GD remain limited. The frontal QRS-T (fQRS-T) angle, an electrocardiographic marker reflecting ventricular depolarization-repolarization heterogeneity, has shown prognostic value in various cardiovascular conditions, but its significance in GD has not been fully elucidated.

Methods

We retrospectively analyzed electrocardiographic and clinical data from 291 patients with Graves' disease and 96 healthy controls. GD patients were further stratified according to the presence of hyperthyroid heart disease. Multivariate logistic regression was used to identify independent predictors of hyperthyroid heart disease. In addition, a retrospective cohort study was conducted in 203 GD patients with complete 5-year follow-up, comparing outcomes between patients with an fQRS-T angle $\geq 90^\circ$ and those with a normal angle. Primary outcomes included all-cause mortality or ventricular fibrillation, while secondary outcomes focused on first hospitalization for heart failure.

Results

An fQRS-T angle $\geq 90^\circ$ was significantly more prevalent in GD patients than in healthy controls and was particularly common among those with hyperthyroid heart disease (all $p < 0.001$). Multivariate analysis identified age, fQRS-T angle, thyroxine (T4), and platelet count as independent predictors of hyperthyroid heart disease. During follow-up, patients with an fQRS-T angle $\geq 90^\circ$ showed a significantly higher risk of first hospitalization for heart failure (HR 5.04, 95% CI 2.59–9.81).

Conclusions

An increased frontal QRS-T angle is associated with elevated cardiovascular risk in patients with Graves' disease. This readily available ECG marker may serve as a useful, hypothesis-generating tool for cardiovascular risk stratification in hyperthyroid populations.



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Keywords: Graves' disease; Hyperthyroidism; Frontal QRS-T angle; Electrocardiography; Cardiovascular risk; Hyperthyroid heart disease

Biography

Mr. Zhen Wang is a cardiologist in the Department of Cardiology at the Second Affiliated Hospital of Anhui Medical University, China. His research interests include cardiovascular manifestations of endocrine disorders, electrocardiographic risk markers, and heart failure. He has published peer-reviewed articles in international journals and is actively involved in academic exchanges in the field of cardiometabolic medicine.