

**THE ROLE OF INTERLEUKIN-10 AND TUMOR NECROSIS FACTOR-ALPHA
IN CHRONIC RHEUMATIC HEART DISEASE**

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Resume: Chronic rheumatic heart disease (CRHD) remains a significant cause of acquired heart defects in children and adolescents. Immune dysregulation is central to disease progression. Cytokines, especially interleukin-10 (IL-10) and tumor necrosis factor-alpha (TNF-alpha), are key modulators of inflammation. This study investigates serum IL-10 and TNF-alpha levels as diagnostic and prognostic markers in pediatric CRHD.

Key words: chronic rheumatic heart disease, interleukin-10, TNF-alpha, cytokines, inflammation, children

Relevance

The pathogenesis of CRHD includes prolonged autoimmune inflammation of the myocardium and heart valves. An imbalance between pro-inflammatory cytokines (for example, TNF-alpha) and

anti-inflammatory cytokines (for example, IL-10) influences the severity of tissue damage and the risk of valvular scarring and cardiac remodeling. Reliable biomarkers are needed to detect active inflammation and guide therapy.

Purpose of the study

To evaluate serum IL-10 and TNF-alpha levels in children with CRHD during active disease and remission, and to determine their diagnostic and prognostic value.

Materials and methods

A prospective observational study included 92 pediatric patients aged 6-17 years with confirmed CRHD admitted to the pediatric cardiorheumatology department from 2022 to 2025. Patients were divided into two groups: Group I (n=54) with active rheumatic activity, and Group II (n=38) in remission. The control group consisted of 30 healthy age-matched children. Serum IL-10 and TNF-alpha concentrations were measured by ELISA. Standard markers (CRP, ESR) and echocardiography findings were recorded.

Statistical analysis used Student's t-test and Pearson correlation; significance was set at $p < 0.05$.

Results

Patients with active CRHD demonstrated significantly higher TNF-alpha levels (mean 42.6 ± 5.8 pg/mL) compared to the remission group (18.4 ± 4.1 pg/mL) and controls (9.7 ± 2.6



pg/mL) ($p < 0.01$). IL-10 levels were lower in active disease (5.2 ± 1.6 pg/mL) than in remission (10.9 ± 2.1 pg/mL) and controls (12.4 ± 2.8 pg/mL) ($p < 0.01$). The TNF-alpha/IL-10 ratio correlated with severity of valvular involvement ($r = 0.68$) and with CRP ($r = 0.61$). Persistently elevated TNF-alpha combined with reduced IL-10 predicted early recurrence within 3-6 months.

Discussion

The imbalance of cytokines characterized by elevated TNF-alpha and reduced IL-10 reflects ongoing pro-inflammatory activity in CRHD and contributes to endothelial dysfunction, fibrosis, and valvular damage. Measuring both cytokines provides greater diagnostic accuracy than routine inflammatory markers alone. The TNF-alpha/IL-10 ratio may serve as a useful prognostic indicator and support personalized anti-inflammatory strategies.

Conclusion

1. IL-10 and TNF-alpha are informative markers of inflammatory activity in pediatric CRHD.
2. Elevated TNF-alpha and reduced IL-10 are associated with active disease and more severe valvular lesions.
3. The TNF-alpha/IL-10 ratio may predict disease progression and recurrence.
4. Serial cytokine monitoring can improve management; larger multicenter studies are recommended to validate thresholds and clinical protocols.

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