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# EVALUATION OF SERUM FERRITIN AS AN INFLAMMATORY BIOMARKER IN ACUTE CORONARY SYNDROME PATIENTS: A CASE-CONTROL STUDY

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## Abstract

**Context/Background:** Acute Coronary Syndrome is still one of the most common and deadly cardiovascular emergencies worldwide.. Serum ferritin, an acute-phase reactant, has been increasingly studied as a biomarker of oxidative stress and systemic inflammation in cardiovascular diseases.
**Aims/Objectives:** To determine serum ferritin concentrations in ACS patients and evaluate their correlation with conventional risk factors for cardiovascular disease.
**Methodology:** A hospital-based, case-control study was conducted including 50 ACS patients and 50 age- and sex-matched healthy controls. Serum ferritin was measured by ELISA. Fasting blood glucose, postprandial blood glucose, lipid profile, CK-MB, and BMI were also assessed. Statistical analysis included t-tests and Pearson correlation.
**Results:** Serum ferritin concentrations were considerably higher in the ACS group (357.56 ± 185.15 ng/mL) than in the control group (107.68 ± 55.87 ng/mL), showing a highly significant difference ($p < 0.001$).Ferritin showed a strong positive correlation with fasting ($r = 0.757$, $p = 0.01$) and postprandial blood sugar ($r = 0.724$, $p = 0.01$), but no significant correlation with lipid parameters or blood pressure.
**Conclusions:** Serum ferritin is significantly elevated in ACS and correlates positively with glycemic status. It may serve as an early, inexpensive, and accessible biomarker for inflammation and cardiovascular risk stratification.

**Keywords**: Acute Coronary Syndrome, Ferritin, Inflammation, Biomarkers, Oxidative Stress.

## INTRODUCTION

The spectrum of Acute Coronary Syndrome, involving unstable angina, STEMI, and NSTEMI, remains a primary cause of morbidity and mortality on a global scale. Myocardial necrosis markers such as troponins and CK-MB are pivotal in diagnosis, but they often rise after irreversible myocardial injury has occurred. Identification of upstream biomarkers that reflect early inflammatory changes could allow earlier diagnosis and risk stratification.
Ferritin, primarily known for storing iron within cells, also acts as an acute-phase reactant during inflammation. Its role in inflammation, oxidative stress, and endothelial dysfunction implicates it in the development and destabilization of atherosclerotic plaques. This study evaluates the role of serum ferritin in ACS patients and its association with established cardiovascular risk factors.

## Methodology

**Study Design**: Hospital-based, case-control study
**Study Population**: Fifty ACS cases and fifty healthy controls, matched for age and sex, were included in the study.
**Inclusion Criteria**:

- Age 18–75 years
- Chest pain within 12 hours
- ECG changes indicative of ischemia
- Elevated CK-MB levels

**Exclusion Criteria**:

- Liver disease, tuberculosis, malignancy
- Chronic inflammatory diseases
- Current iron therapy
- History of prior myocardial infarction

**Sample Collection**:

Venous blood (5 mL) was collected from each subject within 12 hours of symptom onset.

**Biochemical Analyses**:

- Serum Ferritin: ELISA
- Blood Glucose: GOD-POD method
- Lipid Profile: Enzymatic method
- CK-MB: Modified IFCC
- BMI: The Body Mass Index was obtained from actual height and weight measurements.
- **Statistical Analysis**:
  Independent t-tests were used for group comparisons. Pearson correlation was used to assess associations. A *p*-value < 0.05 was considered statistically significant.

## RESULTS

**Demographics**:

- Mean age: 51.18 ± 11.94 years (cases), 51.88 ± 10.06 years (controls)
- Male:Female = 37:13 in both groups

**Key Findings**:

| Parameter | ACS Patients | Controls | *p*-value |
|---|---|---|---|
| Serum Ferritin (ng/mL) | 357.56 ± 185.15 | 107.68 ± 55.87 | <0.001 |
| Fasting Glucose (mg/dL) | 116.84 ± 37.42 | 89.44 ± 20.94 | 0.001 |
| Postprandial Glucose | 187.42 ± 74.34 | 134.32 ± 44.00 | 0.001 |
| LDL (mg/dL) | 134.74 ± 32.33 | 114.36 ± 38.48 | NS |
| HDL (mg/dL) | 37.54 ± 3.64 | 44.06 ± 7.10 | NS |

**Correlations**:

| Parameter | r value | *p*-value | Significance |
|---|---|---|---|
| Fasting Glucose | 0.757 | 0.01 | Significant |
| Postprandial Glucose | 0.724 | 0.01 | Significant |
| LDL, HDL, BP | < 0.2 | > 0.05 | Not Significant |

## DISCUSSION

This case-control study revealed significantly elevated serum ferritin levels in ACS patients, reinforcing the hypothesis that ferritin is involved in the inflammatory and oxidative processes contributing to atherothrombosis. Ferritin acts as both a marker and a mediator of oxidative stress, particularly through catalyzing free radical generation that promotes LDL oxidation and endothelial dysfunction [1–3].

Our findings are consistent with Kiechl et al. [4], who demonstrated an association between ferritin and carotid atherosclerosis. Holay et al. [5] also reported high ferritin levels in diabetic ACS patients, linking it to systemic inflammation and poor glycemic control. The strong correlation observed between ferritin and both fasting and postprandial glucose levels supports the idea that hyperglycemia exacerbates oxidative stress and plaque instability [6,7].

Interestingly, no significant correlation was found with lipid profile or blood pressure. This is comparable to observations by Ghazala et al. [8] and Chua et al. [9], who suggested that ferritin may operate independently of lipid-mediated pathways. These null findings could also stem from confounding effects such as medication use or acute-phase lipid variations.

While CK-MB and troponins indicate myocardial damage, ferritin may serve as a marker of upstream vascular inflammation. Incorporating ferritin in diagnostic panels, especially in low-resource settings, could improve early risk stratification.

## Conclusion

Serum ferritin is significantly elevated in ACS patients and correlates positively with glycemic parameters. It may serve as an early, cost-effective biomarker for cardiovascular inflammation and deserves further investigation in larger, multicenter studies.

## Conflict of Interest

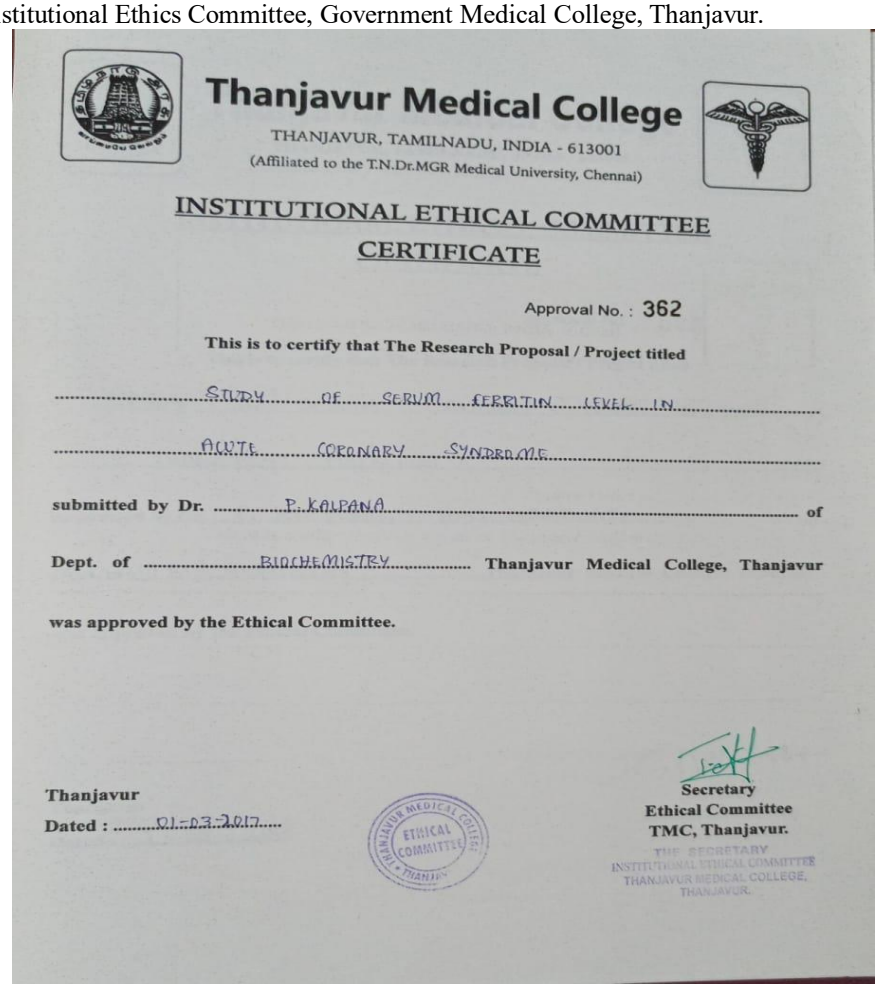
None declared.

**Funding**

No external funding was received.

**Ethical Approval**

Approved by the Institutional Ethics Committee, Government Medical College, Thanjavur.



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INSTITUTIONAL ETHICAL COMMITTEE CERTIFICATE

Approval No. : 362

This is to certify that The Research Proposal / Project titled

STUDY OF SERUM FERRITIN LEVEL IN ACUTE CORONARY SYNDROME

submitted by Dr. P. KALPANA of

Dept. of BIOCHEMISTRY Thanjavur Medical College, Thanjavur

was approved by the Ethical Committee.

Thanjavur

Dated : 01-03-2017

Secretary
Ethical Committee
TMC, Thanjavur.

THE SECRETARY
INSTITUTIONAL ETHICAL COMMITTEE
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THANJAVUR.

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**Authors' Contributions**

Equal contribution by all authors.

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