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Impending role of biomarkers of oxidative stress in myocardial infarction: a comparative study from local population

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ABSTRACT

Background and Objective: Myocardial infarction (MI) causes morbidity and mortality worldwide and is linked to oxidative stress and metabolic markers. This study examines how oxidative stress markers predict myocardial infarction and effect its course, thus having potential for use as markers for early MI diagnosis.

Method: This cross-sectional comparative study was conducted at the University of Lahore, Institute of Molecular Biology and Biotechnology, on 405 clinically proven MI patients with age-matched controls of 20-90 years. Biochemical marker concentrations were determined using standardized ELISA kits on blood samples containing vascular smooth muscle cells. The study examined markers such as lipid peroxidation (DT, MDA, THB, 8-OHdG, 4-HNE, NT, and IsoP-F2α) and antioxidants (SOD, Catalase).

Results: All variables demonstrated a statistically significant difference between MI patients and controls. Serum MDA levels in MI patients were higher than the control group (4.56 ± 1.09 versus 0.932 ± 0.056 nmol/ml, $p = 0.022$). In the MI group, serum oxidative stress levels (8-OHdG, 4-HNE, IsoP-F2α) were greater than in the control group. Patients with MI had reduced SOD, CAT, GSH, Vitamin D, C, and E levels.

Conclusion: In conclusion, oxidative stress and antioxidant enzyme levels predict myocardial infarction outcomes. Low vitamin and antioxidant levels and high MDA, 4-HNE, and isoprostanes levels predispose to MI. The annotations show early patterns and treatment options for oxidative stress in cardiovascular patients.

Keywords: Myocardial infarction, oxidative stress, MDA, 4-HNE, predictive markers.

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