

Introduction: Acute Myocardial Infarction (AMI) remains a leading cause of global morbidity and mortality, driven by complex interactions between metabolic dysregulation, inflammation, and cardiovascular (CV) risk factors. This study aimed to investigate the potential role of Leptin (LEP), Resistin (RETN), and Adiponectin (ADIPOQ) as biomarkers for diagnosis, prognosis, or management of AMI.

Materials and Methods: A case-control study design was used in this study. Samples were collected at Nasiriyah Heart Hospital in Thi-Qar Province from individuals diagnosed with AMI, and samples were collected 8–12 h after symptoms appeared. The total study population comprised 120 individual (healthy and patient), Healthy (n=60) and patient (n=60) who were diagnosed with AMI. Sample collection took place between December 2024 and March 2025, and the study protocol was approved by the IRB (287/2024–December 11, 2024). The statistical analysis for this study was conducted using a comprehensive approach. Data were initially summarized and entered into an Excel spreadsheet, then coded and transferred to GraphPad Prism version 9 for analysis. Both descriptive and inferential statistics were employed. To assess associations between categorical variables, chi-square tests or Fisher's exact tests were utilized, (p value ≤ 0.05). Serum LEP, RETN and ADIPOQ were measured using ELISA kits based on the sandwich principle. Hematological parameters were analyzed using sysmex xp-300 analyzer and all the biochemical parameters were performed using the Clinical Chemistry Analyzer BS-230 from Mindray, China while cTnI was measured by immunofluorescence assay (IFA) method with the AFIAS.

Results: Significant ($p \leq 0.05$). The mean BMI of the MI patients were considerably higher (30.0 ± 4.2 kg/m²) than that of the healthy group (25.3 ± 3.1 kg/m²), although the mean BMI of the MI group was clinically significantly higher. All lipid

parameters, except HDL-C showed a significant increase: AMI patients had lower HDL-C levels (36.8 ± 12.5 vs. 47.9 ± 9.7 mg/dL) and significantly higher mean total cholesterol (244 ± 65.7 vs. 184.1 ± 45.3 mg/dL), LDL-C (158.3 ± 60.7 vs. 103.1 ± 47.4 mg/dL), triglycerides (191.6 ± 86.4 vs. 154.6 ± 60.6 mg/dL), and VLDL (37.4 ± 17.8 vs. 30.7 ± 11.7 mg/dL). There was a significant reduction ($p \leq 0.05$) in HDL-C, where LDL-C, TG and VLDL were significant elevated as compare with healthy group. Significant increase in the total white blood cell count and platelet count in myocardial infarction patients compared to the healthy group. Conversely, the results showed a significant decrease in the packed cell volume and hemoglobin level in acute myocardial infarction patients compared to the healthy control group. Significant increase ($p < 0.01$) in the levels of fasting blood glucose (FBS: 167 ± 75.7 vs. 106 ± 18.44 mg/dL), blood urea (51.5 ± 36.4 vs. 29.6 ± 6.5 mg/dL), and serum creatinine (1.46 ± 1.0 vs. 0.7 ± 0.2 mg/dL) in the AMI group compared to the healthy control group. The results also showed a significant decrease in the estimated glomerular filtration rate (eGFR: 58.4 ± 20.0 vs. 151 ± 42.9 ml/min/1.73 m²) compared to the healthy control group. Significant increase in the level of troponin I in cases of acute myocardial infarction compared to the healthy group. Significantly increase ($p < 0.001$) in LEP and RETN levels in patients with AMI compared to the healthy group. Also, the results showed a significant decrease ($p < 0.001$) in ADIPOQ levels in patients with acute myocardial infarction (3.88 ± 1.8 mg/L) compared to healthy group. The receiver operating characteristic (ROC) curve analysis evaluating the diagnostic efficacy of LEP, ADIPOQ, and RETN in AMI. Leptin (cut-off >2.23 ng/mL) demonstrated the highest accuracy (85%) and area under the curve (AUC: 96%), with 93% sensitivity and 92% specificity. ADIPOQ (cut-off ≤ 4.52 μ g/mL) showed moderate accuracy (73%) and AUC (91%), while RETN (cut-off >305.9 ng/L) had the lowest accuracy (70%) and AUC (87%). All biomarkers exhibited statistically significant discriminative power ($p=0.001$).

Notably, leptin and RETN shared high sensitivity (93%), whereas ADIPOQ had higher specificity (82%).

Conclusion: Elevated LEP levels are a reliable indicator of AMI, elevated RETN levels are likely reflect an inflammatory response rather than serving as a predictive marker, elevated Hs-TnI levels serve as a complementary biomarker for the early detection of myocardial infarction, low ADIPOQ levels are associated with cardiac damage and renal dysfunction, making them a potentially valuable biomarker in AMI assessment and these finding emphasize the importance of incorporating novel adipokine patterns into the diagnosis of myocardial infarction.