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Evaluation of Adropin Levels in Cardiovascular Disease

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Abstract: Biomarker studies for the diagnosis of myocardial infarction are continuing. Adropin is a biomarker that has been researched and found to have various effects. The purpose of this study was to look at the adropin levels of patients who had a myocardial infarction and angina pectoris.
Material and Methods: The control group comprised 30 individuals whose troponin levels did not rise and no coronary lesions were found. In the myocardial infarction group, 30 patients had an elevated ECG, and 30 patients had angina pectoris. They were diagnosed by clinicians and tested for Adropin, Fetuin-A, Selenoprotein-P, MDA, and Copeptin.
Results: In the MI group, a significant increase was observed in the adropin level p < 0.01**. While a strong positive correlation existed between Fetuin-A and adropin (r= 0.82, p< 0.001) as well as between selenoprotein-P and adropin (r= 0.64, p< 0.001).

Keywords: Myocardial Infarction, Angina Pectoris, Adropin Biomarker.

1. INTRODUCTION

CVD

Cardiovascular disease (CVD) refers to a variety of diseases affecting the heart and blood arteries. Coronary heart disease (CHD) causes angina and myocardial infarction (commonly referred to as a heart attack). Strokes, congestive heart failure, high blood pressure cardiovascular diseases, rheumatic heart rhythm, cardiomyopathy, which cardiac arrhythmias, congenital heart failure, heart valve disease, heart failure, coronary artery disease, aortic aneurysms, peripheral arterial disease, thromboembolic disease, and venous thrombosis are some other cardiovascular diseases. The causes behind cardiovascular illnesses differ, with diet-related factors accounting for 53% of related deaths. Atherosclerosis is linked with stroke, coronary artery disease, and peripheral arterial diseases. Gender, age, cigarette smoking, inactivity levels, non-alcoholic fatty liver disease, excessive alcohol consumption, an unhealthy diet, obesity, genetic predisposition, family history, blood pressure, diabetes

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mellitus, hypertension, hyperlipidemia, undiagnosed celiac disease, psychological variables, impoverishment, and a lack of education are all risk factors. While certain factors remain unchangeable, lifestyle changes, social changes, and pharmaceutical therapies can all help to reduce cardiovascular risk factors like hypertension, hyperlipidemia, and diabetes [1].

Being obese elevates the likelihood of developing cardiovascular atherosclerosis. Research based on population studies indicates that atherosclerosis, a key risk factor for cardiovascular disease, begins in childhood. The Path investigation into the biological causes of atherosclerosis in young individuals revealed the presence of intimal lesions in all aortas and over 50% of the right coronary arteries in individuals aged 7 to 9 years. [2]. Adropin is a 4.9 (kDa) peptide encoded by the Enho gene on human chromosome 9[3], is widely distributed in various central nervous system organs, with the highest concentrations found in the heart, kidney, liver, pancreas, and human umbilical cord [4]. It plays a protective role in regulating atherogenesis and cardiovascular diseases, as evidenced by low serum adropin levels in individuals with permanent coronary artery disease [5,6]. More studies indicate that adropin is involved in the regulation of blood sugar and lipid homeostasis, resistance to insulin, reduced tolerance to glucose, obesity, and diabetes, and hyperhomocysteinemia [3,6]. Adropin levels vary based on cardiovascular research findings.

2. RELATED WORKS

The findings of Zheng et al. (2019) study, adropin is related with heart disease, particularly CAD and diabetic cardiomyopathy. The YOSAEE et al (2016) study found that adropin can be relied on as a potential biomarker in the serum for early identification of heart disease, including heart failure, coronary atherosclerosis, myocardial infarction, and heart syndrome. Furthermore, adropin has been related to cardiovascular balance as an additional regulator of blanket function in the Bellina et al (2021) studies.

3. METHODOLOGY

The research was conducted from the month of August, 2023 to the month of October, 2023. The present research utilized a group of 30 male and female participants who were considered to be in optimal health to serve as the study's control group. In addition, a group of 60 male and female patients with cardiovascular disease (Myocardial infarction and Angina pectoris). were recruited from the Tikrit Teaching Hospital- Center in Salah Adin, Iraq, Participants in the data collection were as old as 30-60 years' old. Enzyme-Linked Immunosorbent Assay (ELISA) technique was employed to assess the concentrations of Adropin in serum samples, utilizing commercially available kits (SUNLONG, China). The confirmation of Cardiovascular disease was established by gathering the patients' medical history and conducting various diagnostic tests. A total volume of 5 milliliters of blood was obtained from the participants of the study. The blood samples were then transferred into gel tubes and left undisturbed for a duration of 20 minutes to allow for clot formation. Subsequently, the gel tubes underwent centrifugation at a velocity of 4,000 revolutions per minute for a duration of 15 minutes to facilitate the segregation of serum from other

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constituents of the blood. The samples were subsequently brought to room temperature before conducting the assays. This was done after storing the serum in Plain tubes and preserving it in a deep freezer.

4. RESULTS

The study found that patients with MI had significantly higher levels of Adropin than healthy controls and patients with angina pectoris. The study also found that male MI patients had significantly higher levels of Adropin than female MI patients as shown in figure 1 and figure 2. Additionally, the study found that older MI patients (>50 years) had significantly higher levels of Adropin than MI patients (≤50 years). Additional studies must be conducted to confirm these findings and understand the basic mechanisms of these correlations. These findings suggest that Adropin levels may be a useful marker for the diagnosis and prognosis of MI. cohorts in previous studies, Statistical significance is denoted at a threshold of *p<0.05 and **p<0.01, as illustrated in Table 1.

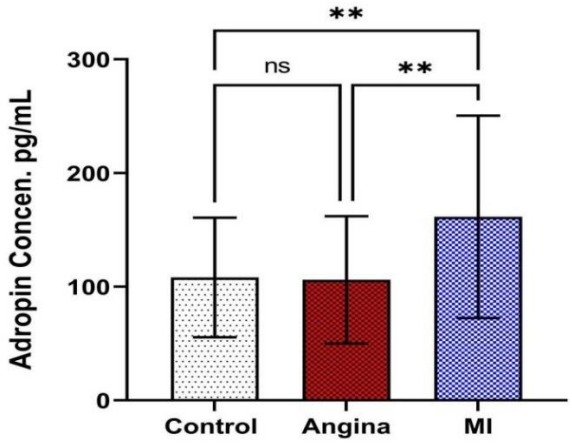

Figure 1. Assessment Serum Adropin (pg/ml) in studied groups.

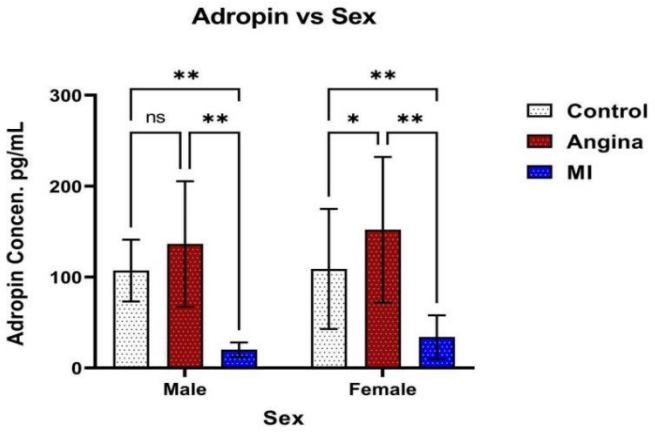

Figure 2. Comparison of Adropin levels according to the sex.

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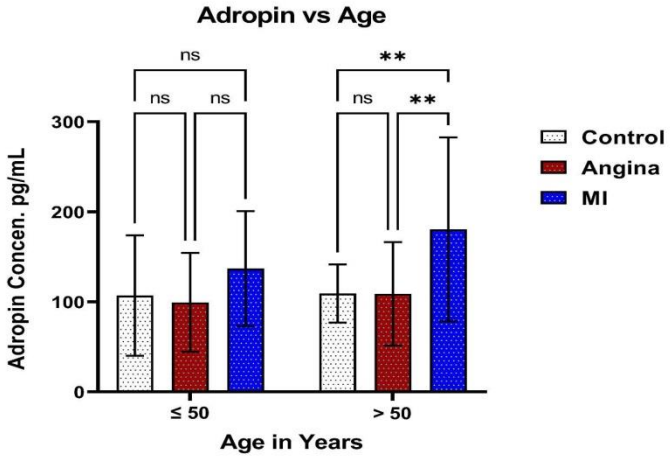

Figure 3. Comparison of Adropin levels according to the age.

Table (1): Adropin Mean and Standard Deviation±:

NO.	Group	N	Adropin	
			Mean	Standard deviation ±
1	Myocardial infarction	30	161.5	89.06
2	Angina pectoris	30	106	55.99
3	Control	30	108.1	52.61
	P-Value	**< 0.01****		**< 0.01****

5. DISCUSSION

Our findings indicate that serum adropin levels were notably elevated in patients with myocardial infarction compared to those with angina pectoris or the control group. This study confirms Mehmet et al. (2022). Adropin immunoreactivity has been observed in a wide range of tissues, including cardiovascular tissue [7]. It is considered to be a significant endocrine factor affecting metabolic control, insulin sensitivity, and endothelial function [3,8. [Adropin contributes to endothelial vascular homeostasis by enhancing the synthesis of nitric oxide through upregulation of the endothelial nitric oxide synthase enzyme. Consequently, research suggests its potential protective role against the pathophysiology of cardiovascular diseases [4, 9]. In a study comparing heart failure patients to healthy individuals, Lian et al. found that adropin levels increased with the severity of heart failure, while remaining low in the healthy control group. [10]. They hypothesized that elevated serum adropin levels contribute to the pathophysiology of heart failure. This study did not agree with The study was performed by Xiansong et al. (2023), and we believe that the difference is due to the therapies offered by the physician during the diagnostic procedure, as well as the period since the individual's disease beginning. It is also related to the type of neighborhood from where the samples were collected and whether or not individuals are affected by other diseases. Xiansong and colleagues (2023) investigated the effect of the novel balance of energy regulatory Adropin

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on the outcomes of acute myocardial infarction patients and found that the low Adropin group had a higher risk of frequent myocardial infarction compared to the high Adropin group. As a result, reduced Adropin levels have been related to an increased risk of long-term recurring myocardial infarction in patients with acute myocardial infarction. MI, a major kind of cardiovascular diseases, advances swiftly and is the leading cause of mortality worldwide. MI will drastically jeopardize and damage people' health and lives if not diagnosed and treated promptly. Although the mortality rate of MI has decreased as medicine has advanced, MACEs following MI remain common and have drawn the Capturing the interest of cardiologists. Furthermore, as a result of the influence of numerous circumstances, MI becomes more common among young people, and its incidence is increasing. As a result, it is critical to discover significant markers with possible prognostic significance in the long-term outcome for acute myocardial infarction. This endeavor aims to diminish mortality, mitigate long-term sequelae of MI, and ultimately improve patients' survival rates and quality of life. Coronary atherosclerotic plaques rupture in response to numerous triggering events, and it is constituents Are provided into the bloodstream to produce thrombosis, this results in an obstruction of the coronary artery, a significant reduction or even cessation of the blood supply to the cardiac muscle, leading to significant myocardial necrosis and ischemia [11, 12]. Cardiovascular biomarkers were once considered the "gold standard" for diagnosing AMI. Both specificity and sensitivity have improved considerably from the use of creatine kinase and CKMB in earlier times to troponin T and troponin I currently. However, an increasing number of studies have found that each biomarker of cardiovascular cell necrosis has limitations [13,14]. Therefore, it is vital for the study of fresh biomarkers and influential variables associated with acute myocardial infarction (AMI) to enhance early detection capabilities forecast long-term prognosis. Adropin, a recently identified secreted regulator peptide implicated in the regulation of energy and response to insulin [15, 16], is expressed in the hepatocytes, brains, vascular cells, and the cardiomyocytes [26, 27]. More recent studies have associated Adropin with cardiovascular diseases such as hypertension, coronary artery disease, and cardiac failure. as well as human energy metabolism [17,18]. Zhao et al [19]. reported significantly decreased serum levels of Adropin in coronary artery disease individuals compared to the control, Low levels of Adropin are associated with more severe coronary atherosclerosis. Similarly, study of Gulen et al. observed considerably Patients with hypertension had lower serum Adropin levels compared to people with healthy blood pressure. Furthermore, sluggish Coronary artery blood flow is among the leading causes of recurrent chest pain in individuals, with a prevalence of 1-7% in CAG patients [20]. it has been linked to sluggish coronary artery the flow of blood, and its levels are much lower in individuals experiencing reduced blood flow [21]. In terms of the association among Adropin and myocardial infarction, Yu et al. [22] discovered that the total serum Adropin level in myocardial infarction patients was significantly decrease than in controls and patients with stable angina pectoris. A decline in Adropin could be an indication of AMI occurrence, according to multiple regression analysis. Furthermore, Ertem et al. [23] Examining individuals with Non-ST segmentation elevated myocardial infarction (MI), It was determined that their serum Adropin level was significantly lower than that of healthy controls. This suggests a potential preventive role for Adropin in cardiovascular disorders like atherosclerosis, myocardial infarction, and coronary artery disease. The low Adropin

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group showed a notably higher incidence of long-term recurring myocardial infarction, indicating an affiliation among low Adropin level and an increased risk of recurrent events. Consequently, Adropin not only showed potential for predicting the likelihood of myocardial infarction occurrence, however it may also be related to the long-term outlook of AMI patient. In those with coronary artery disease patients have high risk for ischemia relatively low risk for bleeding, the recommended dose of rivaroxaban (2.5 mg twice daily) might reduce the danger of recurrent coronary At present, it is uncertain how Adropin protects the cardiovascular system. Endothelial dysfunction is considered to be one of the most significant pathologic modifications to cardiovascular disease progression. In a clinical context, Vascular endothelial dysfunction, among various factors, impacts the risk of coronary artery disease, high blood pressure, and heart failure. This Adropin, a peptide, assists in controlling resistance to insulin and lipid levels in the blood. Adropin is thought to regulate metabolism, reject endothelin, and regulate higher the expression of eNOS. and enhance the generation of (NO), thereby protecting the vascular endothelium [24,25]. According to several research, Homocysteine and inflammatory parameters are negative related with serum Adropin levels, hinting the Adropin could serve as an antagonist against the aforementioned reasons, supplying a cardiovascular preventive impact [28, 29]. Several investigations have established a connection between elevated blood homocysteine levels and the initiation of atherosclerosis and risk factors for cardiovascular disease. This association arises from the fact that heightened levels of blood homocysteine and C-reactive protein are associated with blood vessels damage to endothelial cells and activation of platelets, thereby stimulating Creation and releasing of inflammatory components, which accelerates the progression of atherosclerotic [30,31]. Zhao et al. [28] It was revealed that individuals with hyperhomocysteinemia had lower blood Adropin levels than the healthy group, and that low levels Adropin were associated with high homocysteinaemia and independently associated with more severe coronary atherosclerosis. Hu et al. [32] observed that Adropin considerably reduced TNF-α and IL-6 concentrations in diabetic rats' pancreatic tissues. In their high-fat animal study described by Akcılar et al. [29], parenteral administration of Adropin in mice lowered mRNA levels of IL-6 as well as TNF-α by modulating induction eNOS, improving isocyanine obstruction, and lipid metabolism of the mouse pancreatic. In the study we conducted, a notably lower prevalence of acute myocardial infarction (AMI) in the higher Adropin group against the low Adropin group. This observation aligns with Adropin's involvement in regulating systemic energy homeostasis and insulin resistance, as suggested by Altamimi et al [33]. Adropin controls blood serum metabolism of glucose by increasing the sensitivity of insulin, Promoting the oxidation of glucose while decreasing the amount of fatty acids oxidation. Zang et al. [34] Discovered the individuals with diabetes exhibited notably lower serum of Adropin levels compared to non-diabetics. Adropin displayed an inverse relationship with BMI, hemoglobin A1c, triglycerides, an elevated insulin resistance index, fasting blood sugar levels, and a high-sensitivity C-reactive protein. This suggests that Adropin may play a role in the pathogenesis of diabetes by influencing the sensitivity of insulin, metabolism of lipids, and inflammation. Finally, Beigi et al. [35] discovered that reduced serum Adropin levels were linked to the development of gestational diabetes. Low blood Adropin levels, according to Li et al. [36], were not only associated with the occurrence of diabetes, but also elevated the likelihood of retinopathy from diabetes.

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Additionally, our research identified associations between gender and age, indicating a link to the risk of long-term myocardial infarction (MI). This indicates several factors influence the prognosis of MI patients. MI patients are treated using a systematic strategy that includes risk factor management, prevention of future myocardial infarctions, therapy for reperfusion, and lifelong rehabilitation. consequently, thorough treatment significantly enhances the prognosis and quality lifestyle for those with MI.

6. CONCLUSIONS

According to study results, high Adropin levels are closely linked to heart disease prevention or may be a contributing factor to cardiovascular diseases.

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