

Serum Level of osteopontin Associated with Heart Disease in Iraqi Male

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Abstract— Background: Heart disease is a serious health-care issue in males and females, with high morbidity, death, and costs. Men had a higher chance of developing Heart disease, whereas women were lesser than .

Aim: Osteopontin (OPN) activity was measured by comparing heart disease patients and healthy control subjects in this research. It is critical to use biochemical markers as reliable predictors. Osteopontin biochemical factors in patients with heart disease was assessed and their relationships studied as a result.

Methods: Blood samples were collected from 90 male persons, age range (40-62) years, in Ibn Al-Bitar Hospital for Cardiac Surgery. The subjects was been divided into two groups (60 patients with heart disease and 30-control group). The participants' ages and BMIs were tallied, estimates the lipid profile levels by enzymatic method, and the ELISA technique was used to assess osteopontin levels.

Results: the study appeared a significant difference between the levels of osteopontin in patients and those of healthy individuals. The data showed that HDL levels were statistically different between the sick and healthy groups ($p < 0.05$) in terms of age, BMI, cholesterol, TGs, LDL, and VLDL levels.).

Conclusion: Using OPN as a marker for early identification of heart disease was shown to be effective in this study. According to the findings, OPN is the most useful biomarker for the early detection of cardiovascular disease.

Index Terms— Heart disease, lipid profile, Osteopontin.

I. INTRODUCTION

Osteopontin (OPN) is primarily produced by macrophages entering the infarcted myocardium after a myocardial infarction [1]. Although persistent hyperglycemia is correlating with macrovascular consequences, boosting the risk of myocardial infarction, stroke, and microvascular issues that contributes to DM type 2, it can also evolve into the potentially fatal diabetic ketoacidosis [2-4]. Cardiovascular disease prognosis has considerably improved as a result of recent breakthroughs in preventative therapy [5,6]. Antiplatelet medicines, lifestyle changes, appropriate medical treatment, and coronary revascularization are all examples of current mainstream secondary preventive strategies. Cardiovascular diseases (CVDs) continue to be the major cause of mortality globally despite significant breakthroughs in secondary prevention. For individuals with CVDs, current best medical treatment for secondary prevention should be used. This shows that the dangers of CVDs have been overestimated. Inflammation, pro-

thrombotic factors, and gene alterations, in addition to more traditional risk factors for cardiovascular disease, have recently been studied as potential treatment targets for the disease [7,8]. During the course of an illness, inflammatory and immune cells produce biomarkers into the tissues and blood; many of these biomarkers enter the gingival fluid, the blood, and the saliva and are therefore simple to detect [9]. A matricellular protein known as osteopontin (OPN) that plays a role in a slew of biological processes [10–12]. Osteopontin is a cytokine that stimulates cellular immune responses and acts as a pro-inflammatory mediator [13–15]. Additionally, OPN possesses anti-inflammatory properties, such as bio mineralization [16–18] and wound healing [19,20]. Osteopontin has been demonstrated to play a role in a variety of diseases, such as coronary artery disease (CAD), kidney damage, diabetes, and other chronic inflammatory diseases in animal models [21,22]. The likelihood of bad outcomes is significantly higher in people who have cardiovascular disease [23, 24]. In this study, the effect of osteopontin in patients with heart disease and compared with healthy subjects and its ability to be used as predictor for heart disease.

II. MATERIALS AND METHODS

Totally patients and controls were chosen from subject's presence in Ibn Al-Bitar Hospital for Cardiac Surgery. All patients were allocated an informed consent system, which involved written information describing the countryside of the study before acceptance in this study. Also, medical history of all patients was noted by means of a questionnaire. Blood samples were taken from 90 males, 60 of whom had cardiac disease, between the ages of 40 and 62. They were in the Ibn Al-Bitar Hospital for Cardiac Surgery, where they were receiving care. The control group was comprised of 30 healthy individuals, ranging in age from 40 to 62 years old, who were not taking any medications. The blood was centrifuged for 10 min. at 3000 r.p.m. Polyethylene tubes containing the supernatant were kept at -20°C until further analysis. The participants' ages and BMIs were tallied. Also, multiply the weight by the height to arrive at the BMI. Levels of lipid profile and Osteopontin levels were determined using colorimetric methods and an Elisa kit, respectively.

A. Statistical Analysis:

Microsoft Excel was used to code, input, and analyze the data obtained during the history, fundamental clinical examination, lab tests, and outcome evaluations. To analyze the data, they were transferred to the statistical analysis system (SAS) (2012). Qualitative data was represented by the number and percentage, whereas quantitative data was represented by the mean – standard deviation. T-tests were employed to compare significant differences in mean values. Variable-by-variable estimation of this study's correlation coefficient [25]. The ROC curve was used to establish the appropriate cut-off point for predictors of severity with its sensitivity, specificity, (positive and negative) predictive value.

B. Results

Table (1) shows Mean ± SD of age and BMI in studied groups. The results show high significant difference between heart disease (HD) patients and healthy groups in terms of age and BMI.

Table 1: Comparison of control groups and patients based on Age and BMI

Group	Mean ± SD	
	Age (year)	BMI (kg/m ²)
Control	47.53 ±6.38	24.76 ±1.40
Patients	55.23 ±5.49	28.63 ±3.09
T-test	3.079 **	1.241 **
P-value	0.0001	0.0001

** (P≤0.01).

Table 2 shows the mean± SD values of osteopontin for each group. In compared to control group (p =0.0001), the findings demonstrate substantial increases in the patient groups.

Table 2: Comparison between control and patients groups based on OPN level

Group	Mean ± SD	
	OPN (ng/ml)	
Control	9.58 ±1.59	
Patients	7.61 ±1.26	
T-test	0.743 **	
P-value	0.0001	

Table (3) shows the Mean ± Standard deviation of Lipid profile in studied groups. The results show high significant difference between HD patients and control groups in TG, HDL and VLDL. While, the cholesterol and LDL show non-significant differences between patients and control groups.

Table 3: Comparison between difference groups base on Lipid profile

Group	Mean ± SD (mg/dl)				
	Triglyceride	Cholesterol	HDL	LDL	VLDL
Control	154.43 ±9.98	173.10 ±12.31	46.50 ±5.02	171.86 ±12.80	30.67 ±1.82
Patients	206.23 ±81.50	179.93 ±41.43	36.40 ±10.39	181.53 ±40.95	42.10 ±14.22
T-test	30.01**	15.797 NS	4.217 **	15.683 NS	5.239 **
P-value	0.0010	0.390	0.0001	0.223	0.0001

** (P≤0.01), NS: Non-Significant.

Table (4) summarizes the findings of this study's osteopontin-parameter correlation. There was no statistically significant correlations between osteopontin and any of the studied patient variables, except HDL a positive correlation was recorded with osteopontin levels (r=0.41).

Table 4: Correlation coefficient between OPN and other parameters in control and patients groups

Parameters	Correlation coefficient-r with OPN	
	Control	Patients
Age	0.21 NS	-0.18 NS
BMI	0.04 NS	-0.14 NS
Triglyceride	0.27 NS	0.003 NS
Cholesterol	-0.08 NS	-0.02 NS
HDL	-0.009 NS	0.41 *
LDL	-0.04 NS	-0.03 NS
VLDL	0.23 NS	-0.002 NS

* (P≤0.05), NS: Non-Significant.

C. Receiver Operator Characteristics (ROC) Analysis Curve

An examination of the ROC curve shows that osteopontin has a good performance when compared with healthy people. As shown in Table5 and in figures 1, this conclusion was based on research that included sensitivity and specificity, area under the curve, and other significant features.

Table 5 : ROC analysis data of Osteopontin level of Patient Groups Related to Healthy Group

Area Under the Curve				
Test Result Variable(s): OPN				
Area	Std. Error ^a	Asymptotic Sig ^b	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.838	.050	.000	.739	.937

a. Under the nonparametric assumption
b. Null hypothesis: true area = 0.5

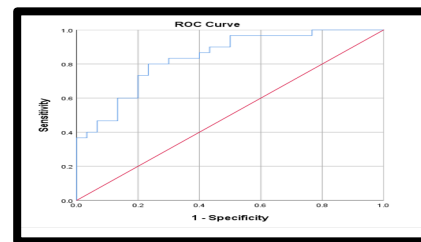


Figure (1): ROC curve of Osteopontin in heart disease

DISCUSSION

Each of Age and body mass indexes (BMI) in this study significantly increased among heart disease compared to control groups. The level of lipid profile shown a considerable increase (p≤0.01) in patient groups in comparison with control groups for each in TG, HDL and VLDL while no significant of cholesterol and LDL. In this result, the level of osteopontin is highly significant in patient groups. This outcome is consistent with prior research [1] that referred the risk factor for BMI more than 30 considers while , many studies presented no significant difference of age and BMI [5,6] . Osteopontin (OPN) is a matricellular protein that has a wide variety of activities and is implicated in a variety of CVD clinical conditions. The phenotypic of OPN is bimodal and changes with the severity of the disease. Wound healing, neovascularization, and the reduction of calcification in the arteries may all benefit from acute elevations in OPN. While persistent increases in OPN do not rely on any known risk factors, they do indicate a high probability of a severe

cardiovascular event [26]. In both humans and mice, several researches have shown the relevance of OPN for the development of atherosclerotic plaque and Wolak summarized these findings in great detail [27]. Aortic, carotid, and coronary atherosclerotic plaques have high quantities of OPN, which is expressed largely in endothelial cells, macrophages, and VSMCs [28, 29]. Mineral statement in the arterial wall and in cardiac regulators may be prevented by OPN, which is also a significant inhibitor of mineral accumulation. As phosphate levels rise, OPN/ VSMCs calcify further than wild-type VSMCs in vitro [30]. De-phosphorylation of OPN in the blood was discovered in an unrelated investigation, though. [31]. Over the course of calcific aortic valve disease development, OPN isoforms were shown to impede bio mineralization but only when phosphorylated [32]. Overall, these findings show that OPN reduces calcification and facilitates closure; nevertheless, to carry out these procedures, OPN phosphorylation is necessary [33]. Some diseases, including obesity, diabetes, and cardiovascular disease, have been associated to anomalies in the lipid profile, particularly high triglyceride and low HDL-C levels. Increased HDL-C levels reduce the risk of cardiovascular disease (CVD) by 2% to 3% [34].

High triglyceride levels have been linked to a higher risk of coronary artery disease (CAD), notwithstanding some controversy [35]. There is a considerable correlation between the presence of high triglyceride levels and low HDL-C levels, which contradicts much previous research, and this shows that the presence of both is a significant risk factor for heart disease [36-38]. There is significant debate about whether the results of this research, which differ from those of Sacks et al. and de Lemos et al., which revealed that elevated levels of Cholesterol and LDL-C constitute an independent risk factor, are relevant to HD risk. [39,40].

CONCLUSION

Patients with heart disease had higher levels of osteopontin than the control group. People who are at risk for heart disease may use serum osteopontin as an early risk factor marker.

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