Association of Serum Myonectin Concentrations With the Presence of Atrial Fibrillation

Chun Wang

Peking University Shenzhen Hospital

Ye Luo

Peking University Shenzhen Hospital

Liangxian Qiu

Peking University Shenzhen Hospital

Xiaosu Li

Peking University Shenzhen Hospital

Qianwen Huang

Peking University Shenzhen Hospital

Xiongbiao Chen (✉ chenxbsz@126.com)

Peking University Shenzhen Hospital

Abstract

Objective: Myonectin, a recently found myokine, has a role of inhibiting inflammation. The aim of this research is to see if myonectin levels are linked to the occurrence of atrial fibrillation (AF).

Methods: We examined serum myonectin in a population of 194 patients with AF who were then classified into three subgroups: paroxysmal AF, persistent AF, and permanent AF. Atrial remolding was assessed using left atrial diameter (LAD).

Results: Serum myonectin was significantly lower in AF group compared with healthy controls. Logistic regression analysis demonstrated that serum myonectin concentrations were correlated with a decreased risk of AF. Patients with permanent AF displayed decreased serum myonectin than in persistent and paroxysmal AF groups. Serum myonectin was lower in persistent AF group than in paroxysmal AF group. Serum myonectin concentrations in AF patients were negatively associated with body mass index (BMI), systolic blood pressure, diastolic blood pressure, and LAD. BMI and LAD stayed to be correlated with serum myonectin according to multiple stepwise regression analysis.

Conclusion: Our study demonstrated a correlation between serum myonectin and AF.

Introduction

Atrial fibrillation (AF), a common cardiac rhythm disorder, is an important indicator of morbidity and mortality [1]. The incidence of AF increases with aging. The development of AF is correlated with changes in the electrical and structural remodeling of the atria [2]. The potential mechanism of AF is still unclear. Recent studies have highlighted significant connection between AF and aging, obesity, and inflammation [3].

Myonectin, also known as CTRP15—C1q/TNF-related protein, stimulates fatty acid absorption in adipocytes and hepatocytes [4]. The myonectin level dropped dramatically after exercise preparation in females [5]. Myonectin blocked lipopolysaccharide induced inflammatory reaction to in macrophages via the S1P/cAMP/Akt-dependent biochemical pathway [6]. This indicates that myonectin has a role of inhibiting inflammation. Inflammation plays a role in the development of AF. As a result, myonectin is thought to play a protective role in the pathogenesis of AF.

We conducted this cross-sectional study to see whether serum myonectin is linked to the development of AF.

Materials And Methods

Subjects

This research was carried out on a group of 194 patients who had been diagnosed with AF. Valvular heart disease, diabetes, hyperthyroidism, acute coronary syndrome, cardiac surgery, and infection disease

during the past month were all exclusion factors for patients with AF. Patients with AF were then divided into three groups: paroxysmal (n=71), chronic (n=60), and permanent (n=63). The control group consisted of 112 healthy adults. The control group was comparable to the case group in terms of age, gender, and body mass index (BMI). The Human Ethics Review Committee at our hospital gave their approval to the study procedure, and each subject signed a consent document.

Measurements

The serum myonectin was estimated using an enzyme-linked immunosorbent assay kit (Aviscera Biosciences, Santa Clara, CA). An experienced echocardiography specialist assessed the left atrial diameter (LAD).

Statistical analysis

The data were exhibited as means ± standard errors or median (interquartile range). The differences of clinical characteristics between the case and control groups were determined using unpaired t test, Chi-square tests, or Mann-Whitney U test. Logistic regression analysis was used to determine the risk factor for AF development. Comparison of the characteristics between the three AF subgroups was performed by Chi-square tests, one-way ANOVA, or Kruskal-Wallis test. Linear regression analysis was utilized to see if there was a correlation between serum myonectin and other variables. P-value of less than 0.05 was thought to be statistically significant.

Results

Baseline clinical characteristics

When compared to controls, AF patients had higher systolic blood pressure (SBP), diastolic blood pressure (DBP), low-density lipoprotein cholesterol (LDL-C), and LAD, as well as lower high-density lipoprotein cholesterol (HDL-C).

Serum myonectin concentrations in AF patients

In the case group, serum myonectin concentrations were lower than in the control group (P< 0.001) (Table 1). SBP, DBP, LDL-C, HDL-C, and serum myonectin were all linked to AF in a univariate logistic regression study (Table 2). After multivariate logistic regression analysis, serum myonectin was still linked to a lower risk of AF (Table 2).

Table 1 Clinical and biochemical characteristics of the case and control groups

	The controls	AF patients	P value
N	112	194	
Age (years)	62.07 ± 10.15	61.55 ± 9.88	0.66
Gender (M/F)	57/55	99/95	0.982
BMI (Kg/m^2)	25.1 ± 2.7	25.34 ± 2.94	0.481
SBP (mmHg)	123.84 ± 9.18	135.02 ± 12.26	< 0.001
DBP (mmHg)	77.19 ± 7.25	83.38 ± 8.98	< 0.001
TC (mmol/L)	4.3 ± 0.84	4.45 ± 1.17	0.253
TG (mmol/L)	1.41 ± 0.52	1.5 ± 0.93	0.333
LDL-C (mmol/L)	2.74 ± 0.47	3.05 ± 0.73	< 0.001
HDL-C (mmol/L)	1.16 ± 0.2	1.09 ± 0.21	0.006
LAD (mm)	28.58 ± 3.69	40.97 ± 4.27	< 0.001
Myonectin (pg/mL)	321.65 (256.11-395.66)	265.81 (222.04-303.63)	< 0.001

Table 2 Logistic regression Analysis for the presence of AF

	Simple regression		Multiple regression	
	OR (95%CI)	*P*	OR (95%CI)	*P*
Age (years)	0.995 (0.972-1.018)	0.658		
Gender (M/F)	0.994 (0.625-1.584)	0.981		
BMI (Kg/m^2)	1.03 (0.949-1.118)	0.48		
SBP (mmHg)	1.101 (1.071-1.132)	<0.001	1.097 (1.055-1.14)	<0.001
DBP (mmHg)	1.103 (1.065-1.142)	<0.001	1.022 (0.971-1.076)	0.849
TC (mmol/L)	1.139 (0.911-1.425)	0.253		
TG (mmol/L)	1.16 (0.859-1.566)	0.333		
LDL-C (mmol/L)	2.138 (1.451-3.151)	<0.001	2.179 (1.341-3.54)	0.002
HDL-C (mmol/L)	0.206 (0.065-0.651)	0.007	0.227 (0.055-0.939)	0.041
Myonectin (pg/mL)	0.987 (0.983-0.991)	<0.001	0.987 (0.982-0.991)	<0.001

Differences in clinical characteristics between AF subgroups

Table 3 shows the characteristics of AF subgroups. Permanent AF patients had elevated LAD and decreased serum myonectin than in paroxysmal and persistent AF patients. In addition, relative to paroxysmal AF patients, persistent AF patients had substantially higher LAD and lower serum myonectin.

Table 3 Clinical and biochemical characteristics of AF subgroups.

	paroxysmal AF	persistent AF	permanent AF	P value
N	71	60	63	
Age (years)	61.76 ± 9.61	62.05 ± 10.54	60.84 ± 9.41	0.774
Gender (M/F)	35/36	30/30	34/29	0.851
BMI (Kg/m^2)	25.47 ± 3.17	25.26 ± 3.06	25.25 ± 2.55	0.89
SBP (mmHg)	135.32 ± 10.91	133.58 ± 13.18	136.03 ± 12.83	0.525
DBP (mmHg)	82.18 ± 7.5	82.67 ± 10.68	85.4 ± 8.53[a]	0.089
TC (mmol/L)	4.51 ± 1.18	4.2 ± 1.16	4.61 ± 1.15	0.126
TG (mmol/L)	1.58 ± 0.9	1.34 ± 0.76	1.56 ± 1.08	0.274
LDL-C (mmol/L)	2.97 ± 0.71	3.05 ± 0.73	3.15 ± 0.77	0.39
HDL-C (mmol/L)	1.16 ± 0.23	1.06 ± 0.21[a]	1.05 ± 0.14[a]	0.004
LAD (mm)	38.19 ± 4.07	41.7 ± 3.18[a]	43.42 ± 3.6[ab]	<0.001
Myonectin (pg/mL)	294.15 (241.88−331.4)	268.07 (224.38-309.12)[a]	245.25 (185.74-275.71)[ab]	<0.001

[a]P< 0.05 vs paroxysmal AF patients; [b]P< 0.05 vs persistent AF patients

The correlation with other variables

Serum myonectin concentrations in AF patients were found to be negatively associated with BMI, SBP, DBP, and LAD in simple linear regression model (Table 4). BMI and LAD are both linked to serum myonectin according to multiple stepwise regression analysis (Table 4).

Table 4 Linear regression analyses between serum myonectin and other clinical parameters

	Simple linear regression		Multiple linear regression	
	r	P	β	P
Age (years)	0.112	0.12		
Gender (M/F)	-0.002	0.983		
BMI (Kg/m^2)	-0.288	<0.001	-0.235	<0.001
SBP (mmHg)	-0.215	0.003	-0.175	0.053
DBP (mmHg)	-0.205	0.004	-0.06	0.504
TC (mmol/L)	-0.008	0.908		
TG (mmol/L)	-0.056	0.439		
LDL-C (mmol/L)	-0.046	0.523		
HDL-C (mmol/L)	0.051	0.478		
LAD (mm)	-0.369	<0.001	-0.325	<0.001

Discussion

AF is a significant predictor of morbidity and mortality. As a result, it's critical to determine the likelihood of AF earlier and then to devise methods to avoid or handle AF. Serum myonectin concentrations were significantly lower in patients with AF than in the controlsaccording to our findings. Serum myonectin may be used as a new biomarker to predict the existence and intensity of AF.

Recent studies have focused on the important role of inflammation in AF pathogenesis. Atrial biopsy specimens from lone AF patients showed the infiltration of lymphomononuclear cells and necrosis of the adjacent myocytes, while those from subjects with sinus rhythm showed no significant inflammation [7]. Inflammatory activity of epicardial adipose tissue was higher in patients with AF than that in controls [8]. Aviles et al reported that subjects with higher C-reactive protein (CRP) levels showed higher prevalence of AF compared with those with lower CRP levels [9]. In addition, CRP was demonstrated to predict the risk for future development of AF. Baseline higher CRP predicted a higher risk for developing future AF after a follow-up of median 7.8 years [9]. On the other hand, anti-inflammatory therapy had an effect on the development of AF. A meta review including 42 randomized controlled trials demonstrated that glucocorticoids treatment significantly lowered participants' risk of developing perioperative AF compared with placebo [10]. Therefore, inflammation is closely correlated with AF mechanism.

In comparison to wild-type mice, ischemia-reperfusion increased the size of myocardial infarcts, cardiac dysfunction, apoptosis, and proinflammatory gene expression such as TNF-, interleukin-6 (IL-6), and monocyte chemoattractant protein 1 (MCP-1) in myonectin-knockout mice [6]. TNF- and IL-6 expression in the ischemic heart was substantially lower in myonectin-transgenic mice relative to wild-type mice [6]. Myonectin incubation reduced lipopolysaccharide-induced expression of TNF-, IL-6, and MCP-1 in macrophages [6]. In diabetic patients, serum myonectin concentrations were found to be inversely linked to CRP [11]. These results pointed to myonectin's anti-inflammatory properties. As a result, myonectin can interact with inflammatory molecules and play a role in the development of AF by promoting the inflammatory action.

There are some possible drawbacks to this report. First, the sample size is insufficient to draw firm conclusions. More research with a large sample size is needed. Second, our research is of a cross-sectional kind. Future longitudinal research would be required to validate the causal relationship.

Finally, serum myonectin levels are inversely linked to the occurrence of AF and atrial remolding.

Declarations

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