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A study of circulatory levels of Apelin in CAD patients in a tertiary care hospital

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Abstract

Apelin is an adipokines secreted by adipose tissue and considered to play a dual role in our body. The exact function of apelin is not yet understood. In obesity, Type 2 Diabetes and CAD it has been studied and contradictory results were obtained. Apelin is not studied extensively in Indian population. Aim of the current study is to determine the circulatory levels of Apelin and compare them in controls and CAD patients. Apelin levels were slightly elevated in CAD patients as compared to controls. But it did not show any association with anthropometric measurements or lipid profile. . A statistically significant difference was observed between CAD and controls in fasting blood glucose [135.49 ± 58.55/93.60 ± 10.06], glycosylated Hb [7.24 ± 2.13/ 4.74 ± 0.83], and lipid profile. It was observed that serum apelin levels were significantly higher in CAD patients as compared to controls [0.55 ± 0.16/ 0.46 ± 0.09]. Conclusion: The current study concluded that apelin levels increases in CAD patients as compared to controls.

Keywords: Apelin, Inflammation, Atherosclerosis, CAD

INTRODUCTION

Adipose tissue secretes various bioactive molecules known as adipokines. Apelin is a secretary protein of adipose tissue and believed to affect various biological functions like neuroendocrine, cardiovascular, and immune functions. It can act via autocrine, paracrine, endocrine, and exocrine signalling. Apelin (recognized as APLN) is a polypeptide, encoded by the APLN gene (1,2). It is extensively expressed in a variety of organs like cardiac tissue, lung, renals, hepatic tissue, adipocytes, instestine, nervous system, adrenals, endothelial cells, and also secreted in circulation. Apelin receptors were located on various cell types (2). It has been observed that it plays an important role in regulation of blood pressure. Its receptors were observed on vessel walls and believed to be involved in controlling blood pressure (3). Further it has been suggested that apelin lowers blood pressure via a nitric oxide-dependent mechanism (4). In obesity it has been observed that insulin stimulates apelin secretion from adipocytes (5). It has been also identified that apelin plays an important role in vasculature. Especially in retinal angiogenesis it has been reported to play a crucial role. (6). Apelin is an adipokine and considered to play an important role in initiation as well progression of inflammation. It has been also believed that it might play an important role

in the pathogenesis of cardiovascular disease. But contradictory results were reported in CAD patients. So it is very difficult to confirm the exact role of apelin in inflammation as well atherogenesis and CAD. Hence more scientific studies will be needed to understand the role of apelin in atherosclerosis and CAD.

A number of studies were done for the evaluation of role of apelin in obesity, Diabetes, hypertension and CAD (8-11). This molecule has been studied by few group of scientist and reported contradictory findings. Hence it is difficult to comment on role of apelin in inflammation and related diseases.

The role of apelin in path physiology of CAD remains to be elucidated. Due to lack of data and contradictory findings, the exact role of apelin on atherosclerosis plaque remains inconclusive.

The aim of the current study is to compare the circulatory levels of apelin between CAD patients and controls.

Study Methodology:

The present study enrolled 68 patients undergoing cardiac surgery at DY Patil medical college and Hospital. A written informed consent was obtained from all the study participants before the enrolment in the study. The study protocol was approved by the Ethics Committee on Human Research at our institution. The CAD group was further sub divided based on presence of co morbidities like type 2 diabetes mellitus and hypertension. Anthropometric measurements were also reported. Body mass index （BMI） was calculated and was used to decide the degree obesity. Circulatory levels of lipid were detected by lipid profile tests like total cholesterol, low-density lipoprotein （LDL） cholesterol, high density lipoprotein （HDL） cholesterol, triglyceride, and fasting blood sugar concentrations were measured using routine auto analyzer.

Statistical analysis

All data were expressed as mean ± SD. The data was presented as descriptive statistics. The comparison between CAD patients and controls were presented as independent students T test. One way analysis of variance ANOVA was used for the comparison of sub groups of CAD. Probability values < 0.05 were considered to be statistically significant.

Results: The present study results reported that all the anthropometric parameters did not show any significant difference in CAD patients and controls. A statistically significant difference was observed between CAD and controls in fasting blood glucose [135.49 ± 58.55/ 93.60 ± 10.06], glycosylated Hb [7.24 ± 2.13/ 4.74 ± 0.83] , lipid profile and Apelin [0.55 ± 0.16/0.46 ± 0.09].

Discussion: Our study observed elevated levels of apelin in CAD patients as compared to controls. The present study findings supported the previous published studies. Hence our findings suggest that apelin might play a crucial role in atherogenesis and CAD. According to some researchers elevated levels of apelin might be associated with inflammatory changes (8) and as per others it is just a compensatory mechanism in obesity (7). While some identified apelin as a promising metabolic target to treat obesity and diabetes mellitus (12). They reported that apelin has an anti-obesity and anti-diabetic properties. Hence as a compensatory mechanism its levels increases in obese patients.

Some studies reported higher expressions of apelin in various tissues or cells like cardiac tissues, cardiomyocytes, vascular smooth muscle cells, and endothelial cells. It was also observed that apelin play a crucial role in cardiovascular system physiology in regard to endothelium-dependent vasodilation, cardiac contractility, and the reduction of vascular wall inflammation (9). In an animal model, administration of apelin induced cardiac hypertrophy and contractile dysfunction of ventricles. Various scientific studies in humans have proposed circulating apelin as a promising predictor for CAD (13-15, 9 and 16).

The mechanism of apelin signalling cascade has also been studied by various researchers. Apelin initiates a signalling pathway mediated by ERKs, Akt, and p70S6kinase phosphorylation (17, 18).These cascades are mainly involved in the formation of angiogenic factors and stimulates angiogenesis. Enhance but uncontrolled angiogenesis might link apelin to initiation of endothelial dysfunction and atherogenesis (19).

Conflict of interest: Nil

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TABLES:

Table 1: Baseline characteristics of CAD and Control

Parameter	CAD (n=58)	CONTROL (n=58)	**Sign**
Age of Patients	58.22 ± 9.46	57.22 ±11.21	.234
BMI	24.60 ± 4.60	25.56 ± 5.00	.288
Subcutaneous fat (%)	25.57 ± 6.60	28.55 ± 7.59	.026
Visceral fat	9.12 ± 4.37	8.15 ± 4.56	.247
Fasting sugar	135.49 ± 58.55	93.60 ± 10.06	.000
HbA1c	7.24 ± 2.13	4.74 ± 0.83	.000
Cholesterol	187.16 ± 37.93	143.54 ± 27.18	.000
Triglyceride	193.15 ± 81.48	112.05 ± 28.51	.000
HDL	39.11 ± 6.95	46.74 ± 7.22	.000
LDL	107.06 ± 35.94	73.53 ± 26.30	.000
VLDL	40.50 ± 21.28	22.77 ± 5.84	.000
Apelin (ng/ml)	0.55 ± 0.16	0.46 ± 0.09	.000

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Table 2: Comparison of variables in CAD sub groups based on presence of DM and HTN

Parameter	CAD with DM (n=11)	CAD with HTN (n=14)	CAD with Both DM and HTN (n=24)	CAD with No DM & HTN (n=9)	p-Value
Age	59.81 ± 10.11	56.28 ± 9.08	58.66 ± 9.91	58.11 ± 9.10	0.821
BMI	24.42 ±3.62	25.70 ± 5.67	24.24 ± 4.68	24.09 ± 4.03	0.791
Body fat (%)	28.14 ± 7.15	30.16 ± 4.66	29.65 ± 10.99	26.19 ± 6.60	0.687
Subcutaneous fat (%)	25.71 ± 7.14	27.45 ± 3.94	24.96 ± 7.80	24.08 ± 6.04	0.625
Visceral fat	9.63 ± 3.82	10.92 ± 4.49	8.50 ± 4.50	7.33 ± 4.03	0.212
Fasting sugar	192.90 ± 97.11	100.04 ± 15.04	142.99 ± 36.68	100.44 ± 10.88	0.000
HbA1c	9.53 ± 2.90	5.77 ± 0.89	7.53 ± 1.58	5.96 ± 0.50	0.000
Cholesterol (mg/dl)	192.82 ± 37.46	198.50 ± 35.89	188.79 ± 36.41	158.22 ± 37.07	0.075
Triglyceride (mg/dl)	203.30 ± 131.30	190.57 ± 31.13	198.33 ± 81.04	170.91 ± 67.16	0.821
HDL (mg/dl)	37.88 ± 9.14	40.62 ± 5.70	39.27 ± 7.01	37.84 ± 6.15	0.734
LDL (mg/dl)	109.27 ± 35.18	119.79 ± 36.69	106.48 ± 36.67	86.14 ± 28.61	.0183
VLDL (mg/dl)	40.78 ±26.06	38.06 ± 6.27	44.15 ± 26.62	34.19 ± 13.43	0.652
Apelin (ng/ml)	0.69 ± 0.22	0.55 ± 0.13	0.53 ± 0.11	0.41 ± 0.09	0.001

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