



Original Research Article

Assessment of Serum Adiponectin and Lipid Parameters in Patients of Acute Myocardial Infarction

Kumud N Harley¹, Kanchan Mohod², Jayshri Jankar³, Satish Kumar⁴

¹Associate Professor, ²Assistant Professor, ³PG Student, ⁴Professor,
Dept. of Biochemistry, Mahatma Gandhi Institute of Medical Sciences Sevagram, Mahatashtra,

Corresponding Author: Satish Kumar

Received: 18/06/2015

Revised: 10/07/2015

Accepted: 10/07/2015

ABSTRACT

Background: Several studies have been carried out to evaluate the plasma Adiponectin levels and its associations with chronic heart disease. However, limited data is available regarding the serum Adiponectin levels and the Acute Myocardial infarction (AMI) especially in central India.

Material and Methods: The present cross sectional study was conducted at tertiary care hospital in central India. Study groups comprised of 101 AMI cases and 100 age and sex matched apparently healthy controls to assess the status of serum Adiponectin and lipid parameters.

Observations: We have observed significantly low serum Adiponectin levels in AMI patients as compared to controls with P value 0.0001. In addition, when compared with lipid parameters, Adiponectin levels were positively related with high density lipoprotein cholesterol, whereas, negatively correlate with the serum triglycerides, Total Cholesterol and Low density lipoprotein Cholesterol. In addition when compared lipid parameters between controls and cases, significantly increased Serum triglycerides (P=0.0001) and Total Cholesterol (P=0.001) and low density lipoprotein cholesterol (P=0.0001) and significantly low serum High density lipoprotein Cholesterol with P=0.0001 were observed respectively in acute myocardial infarction cases as compared to Controls.

Conclusion: low serum Adiponectin may be considered as a risk factor for a development of atherogenesis and eventually for Acute Myocardial Infarction.

Keywords: Serum Adiponectin, Lipid Parameters, Acute Myocardial Infarction.

INTRODUCTION

Adiponectin is a collagen-like plasma protein produced specifically by adipose tissue (adipokines), is abundantly present in the circulation. It is an important bioactive mediator expressed in healthy individuals and has potent anti-atherogenic, anti-inflammatory properties.^(1,2)

It has also been extensively studied that adipokines play a large role in systemic

as well as local inflammation. Inflammation is widely known to play a crucial role in development and progression of cardiovascular events. Hence, Adiponectin may have the important role in many diseases. It has been apparent recently that it influences inflammation, insulin resistance and diabetes. But the precise role in atherosclerosis is still obscure.⁽³⁻⁵⁾ various studies have been carried out which explains

the association of plasma Adiponectin with cardiovascular diseases. ^(6,7) Adiponectin is regarded as a protective adipokine associated with lower risk of myocardial infarction which tends to accumulate in the injured artery from plasma and suppresses the endothelial inflammatory response and vascular smooth muscle cell proliferation and in addition protects macrophages to transform into foam cells. ⁽⁸⁾ In vivo and in vitro studies have supported the assertion that Adiponectin has antiatherogenic, antiangiogenic, cardioprotective and anti-inflammatory effects. ^(8,9) In contrast, lack of association between Adiponectin and coronary heart disease has been observed by Sattar N et al. ⁽¹⁰⁾ Although several studies have been carried out that suggested association of Adiponectin and coronary artery disease (CAD), but most of them have been done on chronic ischemia. Limited studies are available about the Adiponectin and acute myocardial infarction (AMI) in Indian population.

Thus in the light of above, the present study has been planned with following objectives

1. To assess Serum Adiponectin levels in patients of Acute Myocardial Infarction (AMI).
2. To evaluate Lipid profile parameters in patients of AMI and Controls.

MATERIALS AND METHODS

Study Design: A hospital based cross sectional study was carried out at Mahatma Gandhi Institute of Medical Sciences and Kasturba Health Society Hospital, Sevagram Wardha during 1st April, 2013 to 31 April, 2015.

Selection of Cases and Controls: The study was conducted on 101(N=101) Acute Myocardial Infarction (AMI) Patients between age of 35-70 years admitted to ICCU at department of Medicine of our Institute with history of chest pain of less than 6 hrs duration. AMI Patients were

confirmed by raised serum levels of CK-MB, troponin and ST segment elevation or T wave inversion changes on Electro Cardio Graph (ECG). Total number of 100 (N=100) age and sex matched apparently healthy controls were also selected in the age group between 35-70 years.

Exclusion Criteria: Patients with history of smoking, valvular heart disease and obesity, any other major illness that affect the lipid and serum adiponectin levels were excluded from the study.

Sample Collection and Sample Size: The study was commenced after obtaining clearance from the Institutional Human Ethical Committee. The subjects were selected after obtaining the written informed consent from cases and controls. About 5ml of fasting blood was collected from anticubital vein, allow to clot, centrifuge and serum was separated and processed immediately for estimation of lipid parameters or stored at 2-8 °C till the use after addition of 2% sodium azide. For estimation of serum Adiponectin, serum samples were stored at -20°C till the use after addition of 2% Sodium Azide.

Method For Analysis: The serum total Cholesterol (TC) was estimated by CHOD-PAP method, ⁽¹¹⁾ Serum triglycerides (TG) by GPO-TRINDER method, ⁽¹²⁾ High Density Lipoprotein-Cholesterol (HDL-C) by modified PVS (polyvinyl sulfonic acid) and PEGME (polyethylene-glycol-methyl ether) coupled classic precipitation method. ⁽¹³⁾ All lipid parameters were assayed using the "ERBA" reagent kits supplied by Transasia Biomedical Ltd. Mumbai

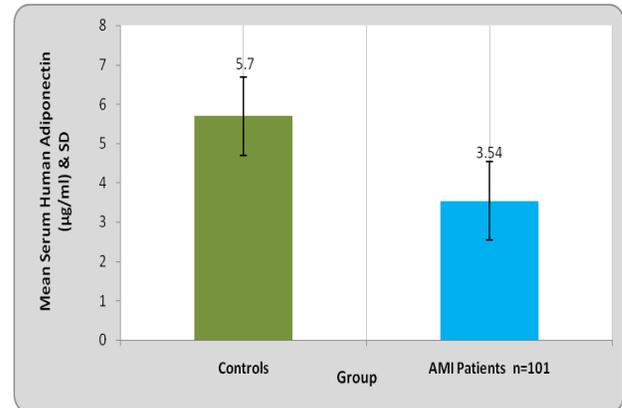
Very Low Density Lipoprotein (VLDL) and Low Density Lipoprotein-Cholesterol (LDL-C) were calculated as recommended by Friedwald et al in 1972. ⁽¹⁴⁾ Whereas, serum human Adiponectin was estimated by sandwiched Enzyme Linked Immunosorbent Assay kit supplied by Avibion Oy, Finland.

Statistical Analysis: Data was entered in SPSS software and statistical analysis was done by applying suitable test (“t” test) for identifying the difference between two means and Standard deviation. P<0.05 was considered as level of significance (p<0.05).

RESULTS AND OBSERVATIONS

Table 1 and 2 shows the results observed in controls and AMI cases and are expressed in mean ± standard deviation. As seen in Table1- Levels of Serum total cholesterol, Triglycerides, LDL-C were found significantly high in AMI cases as compared to controls with P>0.0001, whereas concentration of LDL cholesterol was observed statistically significantly low with P>0.0001. However, when compared serum adiponectin concentration between

AMI and controls groups the significantly low levels was demonstrated in AMI cases as compared to controls (Table 2 & Graph 1). Mean age for AMI cases was 54.03 years and 52.26 years for controls respectively.



GRAPH 1: SERUM ADIPONECTIN LEVELS STUDIED IN AMI CASES AND CONTROLS

Table 1: VARIOUS PARAMETERS STUDIED IN AMI CASES AND CONTROL

Lipid Parameters	AMI Cases (N=101) Mean ± SD	Controls (N=100) Mean ± SD	z -Value	P Value
Total Cholesterol (TC) (Mg %)	187.99 ± 24.05	161.90 ± 11.16	9.87	0.0001*
Triglycerides TG (mg %)	171.09 ± 27.08	140.20 ± 17.64	9.59	0.0001*
HDL-C mg %)	30.69 ± 4.58	42.95 ± 3.97	20.25	0.0001*
LDL-C (mg %)	119.09 ± 15.11	96.63 ± 8.83	12.88	0.0001*
VLDL (mg %)	30.69 ± 4.58	27.85 ± 3.64	10.21	0.0001*
AGE in Years	54.03 ± 7.75	52.26 ± 5.27	1.90	0.059 NS

HDL-C=High density Lipoprotein cholesterol; LDL-C= Low density Lipoprotein cholesterol
VLDL=Very Low density Lipoprotein. *= Significant; NS=Non Significant.

Table 2: SERUM ADIPONECTIN STUDIED IN AMI CASES AND CONTROLS

Parameter	AMI cases (N=101) Mean ± SD	Controls (N=100) Mean ± SD	z -Value	P Value
Serum Adiponectin (µg/ml)	3.54 ± 0.43	5.70 ± 1.65	12.62	0.0001*

*Significant

DISCUSSION

It is well known that Adiponectin has antiatherogenic as well as anti-inflammatory properties that may involve in preventing progression of coronary artery disease. In healthy individuals Adiponectin plays important role in maintaining anti-inflammatory properties however in disease conditions where levels of Adiponectin decreased results in activation of proinflammatory signaling and thus further

exacerbation of the condition. (3) It tends to accumulate in the injured artery from plasma and suppresses the endothelial inflammatory response and vascular smooth muscle cell proliferation and in addition protects macrophages to transform into foam cells. (8) Present study demonstrated statistically significantly lower levels of serum Adiponectin in AMI cases as compared to controls with z value 12.62. Our results were linear with the earlier study carried out by

Tobias P. et al ⁽¹⁵⁾ where he found that the high plasma Adiponectin are associated with lower risk of AMI over a follow up period of six years among men. Iram Fayyaz et al ⁽⁵⁾ although found low levels of serum Adiponectin compared to controls among Coronary artery disease, but the observed difference between two means was not statistically significant. Kumeda et al in 2003 ⁽¹⁶⁾ stated that the decreased serum Adiponectin below 4.0 microgram per ml was associated independently after adjustment with other established risk factors in men population. Similar results were found by several other workers ^(3,17,18) In contrast, lack of association between Adiponectin and coronary heart disease has been observed by Sattar N et al. ⁽¹⁰⁾ Association of lipid parameters with AMI has been extensively studied till date. In the present study we found high levels of serum TC, TG, LDL-C and Low HDL-C in AMI cases when compared with controls which is in accordance with the earlier studies done in past ⁽¹⁹⁻²⁰⁾ and are known risk factors for development of atherosclerosis and eventually for AMI.

CONCLUSION

We found decreased concentrations of serum Adiponectin in AMI cases as compared to controls indicated stimulation of inflammatory signaling pathway and thus more exacerbation of the disease condition. Furthermore, more prospective studies need to be warranted to explore role of serum Adiponectin as novel predictor marker for assessing risk of AMI with more sample size. In future, we are planning to investigate the association of age, sex and individual lipid parameters with the serum adiponectin in metabolic disorders including AMI.

ACKNOWLEDGEMENT

Authors wish to thank UGC, New Delhi for sanctioning minor research project (F.No.390/12/9.4.2013 (WRO) Pune) for providing financial assistance to carry out this work. The authors are grateful to them for their keen interest and encouragement. We also wish to thank JBTDRC, Sevagram, specially Smt. Sandhya Ingole and Manisha Kalne and laboratory staff from Clinical biochemistry laboratory for their assistance in performing the assay.

REFERENCES

1. Kimura K, Shin-ichiro M, Atsushi W. et al. Association between cardiac function and metabolic factors including adiponectin in patients with acute myocardial infarction. *Journal of Cardiology.*(2009); 53(): 65—71
2. Piestrzeniewicz K, Łuczak K, Komorowski J et al. Obesity and adiponectin in acute myocardial infarction. *Cardiology Journal.*2007;Vol.14,(1):29–36
3. Elham OH, Nayel AZ and Amal K N et al. Serum Levels of Adiponectin and Ghrelin in Patients with Acute Myocardial infarction. *Life Science Journal.*2012; 9(2): 523-526 <http://www.lifesciencesite.com>
4. Shah A, Mehta N, Muredach P. et al. Adipose Inflammation, Insulin Resistance, and Cardiovascular Disease. *JPEN J Parenter Enteral Nutr.*2008; 32(6):638–644.
5. Iram F, M.Zamir A, Shah SI et al. Serum Adiponectin Levels in Patients with Coronary Artery Disease. *J Ayub Med Coll Abbottabad.*2009;21(4):
6. Ursula M and Axel MG. Endocrine Regulation of Energy Metabolism: Review of Pathobiochemical and Clinical Chemical Aspects of Leptin, Ghrelin, Adiponectin, and Resistin. *Clinical Chemistry.*2004;50(9):1511–1525
7. Ouchi N, Kihara S, Arita Y et al. Adipocyte-Derived Plasma Protein, Adiponectin, Suppresses Lipid Accumulation and Class A Scavenger Receptor Expression in Human Monocyte-Derived Macrophages. *Circulation.*2001;103:1057-1063
8. Okamoto Y, Kihara S, Ouchi N, et al. Adiponectin Reduces Atherosclerosis in Apolipoprotein E-Deficient Mice. *Circulation.* 2002;106():2767-2770
9. Wilson SR, Marc S, Sabatin C, et al. Assessment of adiponectin and risk of recurrent events in patients presenting with

- an acute coronary syndrome: observation from the pravastatin or atorvastatin evaluation and infection trial-thrombolysis in myocardial infarction. *American Heart Journal*.2011;161(6):1147-1155
10. Sattar N, Wannamethee G, Sarwar N.etal. Adiponectin and coronary heart disease: a prospective study and Meta-analysis. *Circulation*. 2006; 114():623-629.
 11. Allain CC, Poon LS, Chan CS, Richmond W, Fu PC. Enzymatic determination of total serum cholesterol. *Clin Chem*.1974; 20(4):470-5
 12. Mc Gowan MW. Method for triglycerides estimation. *Clin Chemistry*.1983;29():538
 13. Burstein M, Scholnick HR, Morfin R. Rapid method for the isolation of lipoproteins from human serum by precipitation with polyanions..*J Lipid Res*. 1970;11(6):583-95
 14. Fredewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. *Clin Chem*.1972 .;18(6):499-502
 15. Tobias P, Cynthia JG, Gokhan SH etal. Plasma Adiponectin Levels and Risk of Myocardial Infarction in Men .*JAMA*..2004;291 (April 14):1730-1737
 16. Kumada M, Kihara S, Sumitsuji S etal. Association of hypoadinectinemia with coronary artery disease in men. *Arterioscler Thromb Vasc.Biol*.2003;23():85-9
 17. Matsubara M, Maruoka S, Katayose S. Decreased Plasma Adiponectin concentrations in women with dyslipidaemia. *J Clin Endocrinol. Metab*.2002;87():2764-9
 18. Kajima S, Funahashi T, SakamotoT etal. Variation of Plasma concentrations of a novel, Adipocyte derived protein, Adiponectin in patients with acute myocardial infarction. *Heart* .2003; 89():667-8.
 19. Gambhir JK, Kaur H, Gambhir DS etal. Lipoprotein a as an independent risk factor for CAD in patients below 40 years of age. *Ind.Heart J*.2000;52(4):411-415
 20. Abraham G. Evaluation of variation in the lipid profile and risk for coronary artery disease in healthy male individuals with respect to age. *Int J Res Med Sci*.2014; 2(2): 551-556.
 21. Haddad FH, Omari AA, Shamailah QM, et al. Lipid profile in patients with coronary artery disease. *Saudi Med J* .2002; Sep 23((9)):1054-8.

How to cite this article: Harley KN, Mohod K, Jankar J et. al. Assessment of serum adiponectin and lipid parameters in patients of acute myocardial infarction. *Int J Health Sci Res*. 2015; 5(8):284-288.
