ORIGINAL ARTICLE

Serum Interleukin-6 and Lipid Atherogenic Index Risk Ratios as Interpreters of Cardiac Disease in Obese and Non Obese Male Patients of Coronary Artery Disease

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ABSTRACT

Aim: To evaluate serum Interleukin-6, and lipids as predictors of cardiovascular diseases (CVD) in obese and non obese male patients of coronary artery disease (CAD).

Methodology: It was cross-sectional comparative study. Serum Interleukin-6 and lipid profile was determined in non diabetic, non smoker and non hypertensive age matched obese and non obese male patients of CAD and healthy subjects. Sixty male subjects were divided equally into groups. Group 1, healthy controls (n=20), group 2, non obese male patients with CAD (n=20) and group 3 included Obese male patients with CAD (n=20). The serum was assayed for lipid profile and interleukin-6 .

Results: Age matched healthy and patients were non diabetics, non hypertensive and non smoker with altered lipid profile in obese and non obese male patients with coronary artery disease. Patients have high serum cholesterol, low density cholesterol(LDL-C), Triglyceride(TG,) very low density lipoprotein(VLDL) and interleukin-6. The High density lipoprotein was lowered in both obese and non obese male patients with CAD. Significant positive correlation was observed in CAD group of IL-6 with TC (rho= 0.405, p= 0.009*) , with TG (rho= 0.639, p= 0.000*) ,with LDL (rho= 0.398, p= 0.002*), with VLDL (rho= 0.315, p= 0.014*). Significant negative correlation was observed in CAD group of IL-6 with HDL (rho= -0.565, p= 0.000*) Significant positive correlation was observed in CAD group of IL-6 .Significant positive correlation of IL-6 was observed with AI (rho= 0.602, p= 0.000*).

Conclusion: Dyslipidemia, Raised interleukin-6 and strong positive correlation of Atherogenic index with IL-6 are independent risk factors for CVD; using Atherogenic risk ratios as a screening tool for the estimation of CVD risk is useful in patients with CAD.

Keywords: Lipid profile, serum interleukin-6,Atherogenic index,coronary artery disease.

INTRODUCTION

Cardiovascular diseases including heart disease is major cause of deaths in Pakistan as in other countries. Risk factors include hypertension, changed lipid profile, inheritance, obesity and sedentary lifestyle. Main factor is changed lipid profile which shows a significant role[1].

Raised levels of total cholesterol,low density lipoproteins,triglycerides,very low density lipoproteins andvlower level of high density flipoproteins shows an important role in cgrowth of atherosclerosis which is an inflammatory process. and will lead to CAD[2].

Inheritance, innate immunity and environment can lead to Atherosclerosis[3]. It can be accentuated by high blood pressure, diabetes mellitus, obesity and clotting disorders. Obesity have main role in development of both inflammation and atherogenesis by upsetting lipid metabolism. Lower values of high density lipoproteins and high values of low density lipoproteins have trivial part in heart diseases as told by Steinberger and Daniel[6]. This causes at vessels the enhanced production of white blood cells by vascular cell adhesion molecules[7].

A new parameter known the atherogenic index of plasma (AIP) has been found by investigators which expose the balance between. atherogenic and anti-

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atherogenic features. It is a strong indication for expecting the risk of CAD[8,9,10]. It is a relation of molar concentrations of triglycerides to HDL-cholesterol. Normal value of AIP is -0.3 to 0.1 and considered as low risk, 0.1 to 0.24 with medium and above 0.24 with high CV risk[11,12].

Many studies were done to show the relationship of AIP with Heart disease like in Iran, the value of AIP was positively associated with waist circumference and body mass index and was inversely linked with physical activity[8]. AIP was not self-determining factor for cardiovascular disease in Cameroonian postmenopausal women by Nansseu et al[13]. The correlation was found between AIP and heart disease in a prospective cohort study by Hartopo et al in admitted patients of CAD[1].

Many other inflammatory markers like Interleukin-6 rises the risk of clotting and cellular injury.

CAD can be done by adhesion of white blood cells at vessel wall[1] by IL-6. Death rate can be increased also in acute heart patients[16]. The raised AIP level is linked to the threat of CAD in the non obese and obese male patients with CAD remains unknown. Therefore, the resolution of this study was to compare the relationship between AIP and the risk of heart disease with healthy male patients. Other purpose is to detect IL-6 levels and correlate it with lipid profile.

SUBJECTS AND METHODS

It was cross-sectional study was piloted at the setting of Punjab institute of Cardiology Pakistan. Ethical approval was taken from UHS.

Study Population: Sixty male subjects 20 Healthy with no disease and 20 non obese male patients with CAD and 20 obese male with CAD diagnosed by angiography were taken.

Exclusion criteria: Patients who are smoker, diabetic and hypertensive were excluded from the study. History and physical examination was done. Printed educated consent was taken. After fasting, 10 ml of venous blood was taken to determine the lipid profile (serum total cholesterol, triglyceride, very low density lipoprotein and High density lipoprotein (HDL).Estimation of serum Interleukin-6 was performed by kit (manufactured by IBL international GMBH Germany with analyzer STAT FAX 303 Reader.

Statistical analysis: Data was interpreted using SPSS20.0. Distribution of the data was found to be non normal by Shapiro Wilk's test. Spearman's principle was applied. A p-value less than 0.05 was taken to be significant.

Fig.1: Scatter plot showing positive correlation between serum IL-6 and Atherogenic Index in coronary artery disease male patients (B & C, n=40) using spearman's rho correlation coefficient (p value= 0.000*)

RESULTS

Table 1: Comparison of serum interleukin-6 between group A, group B and group C by using Mann-Whitney U test

Biochemical Parameters	Healthy (n=20)	B (n=20)	*p*
Serum Interleukin-6 (pg/ml)	0.000 (0.000- 0.000)	0.6000 (.000- 4.9000)	0.004*
	A (n=20)	C (n=20)	*p*
Serum Interleukin-6 (pg/ml)	0.000 (0.000 - 0.000)	12.800 (7.300 - 16.425)	0.000*
	B*** (n=20)	C**** (n=20)	*p*
Serum Interleukin-6 (pg/ml)	0.6000 (0.000- 4.9000)	12.800 (7.300 - 16.425)	0.000*

Table 2: Comparison of serum interleukin-6 between all three groups by using Kruskal Wallis Test

Group	A	B	C	Chi square	Df	P value
Interleukin-1	15.33	28.28	47.90	39.269	2	0.000*

p-value ≤ 0.05 significant.

Table 3: Comparison of Atherogenic index of Plasma (AIP) between groups A and CAD (B & C, n=40)

Parameter	A (n=20)	CAD (B & C (n=40)	P value
AIP	0.39 ± 0.11	0.62 ± 0.22	0.000*

Table 4: Correlation of serum interleukin-6 with lipid profile

| Correlation b/w serum IL-6 and Lipid profile	A		B		C		CAD(n=40) B and C	
	rho	p	Rho	p	rho	p	rho	p
Total cholestrol (mg/dl)	0.119	0.616	0.234	0.322	0.043	0.859	0.405	0.009*
Serum Triglycerides (mg/dl)	0.259	0.271	0.088	0.712	0.377	0.377	0.596	0.000*
Serum HDL (mg/dl)	0.299	0.206	0.165	0.487	0.100	0.675	0.565	0.000*
Serum LDL (mg/dl)	0.060	0.803	0.208	0.378	-0.029	0.902	0.398	0.002*
Serum VLDL (mg/dl)	-0.299	0.388	-0.204	0.388	0.516	0.020	0.315	0.014*
Atherogenic index	0.338	0.145	0.004	0.987	0.247	0.294	0.602	0.000*

p-value ≤ 0.05 is considered statistically significant

DISCUSSION

After conduction of study values of given parameters like Total, cholesterol, Triglycerides and Interleukin-6 was measured. Atherogenic index was calculated.

The value of serum interleukin-6 was considerably high in both study groups as compared to healthy male. Study group according to more weight and same weight as healthy group have higher values of serum triglycerides, circulating cholesterol, LDL and VLDL. Lower value was
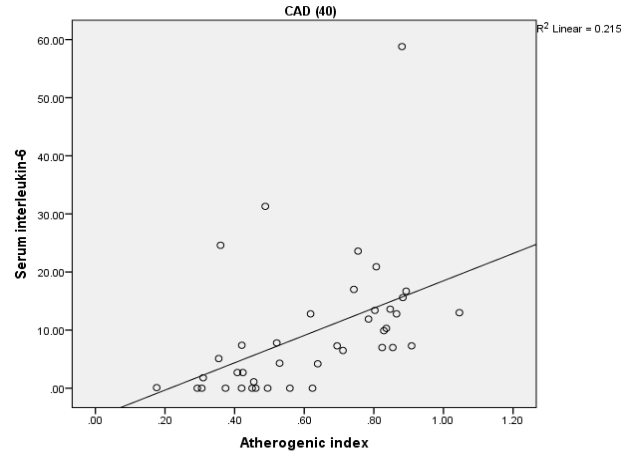
HDL .Major positive correlation of IL-6 was found with Total serum Cholesterol, serum LDL, serum TG, serum VLDL and Atherogenic index and negative correlation with HDL when both obese and non obese groups were collected (n=40).

The results are in agreement with the findings of other study[17]. Another same finding was observed in healthy children with associated overweight, cardiac problems due to higher circulating IL-6[18]. The degrees of CRP and IL-6 were raised in Heart patients[19].This demonstrates about

extra arrival of IL-6 in overweight subjects which can lead to development of atherosclerosis[20]. Both irritation and higher IL-6 are interlinked[21].

The correlation might affect fat metabolism and causes abovementioned effects. Atherosclerosis in CAD[22] has been reported in literature. Chronic coronary heart disease was linked with long term elevated levels of IL-6[23]. Other important parameter in CAD is lipid profile. Circulating IL-6 levels in combined study (40) group showed significant correlation.

Deranged lipid profile is one of known cause for heart disease[2] and can be forecasters for cardiac issues. The relation of molar concentrations of triglycerides to HDL-cholesterol is AIP investigated by Dobiasova[11].

In current study the atherogenic index of plasma (AIP) was not considerably different in healthy group. However a great difference between healthy and study group.

AIP has also been shown to be useful in a clinical setting, since it was found to be a superior marker for cardiovascular events (i.e., death, atherosclerosis, and stroke) than other biomarkers such as LDL-C, triglycerides, and non- HDL cholesterol[19]. Similarly, AIP has been found to be increased in patients with critical heart disease, making it a lower-cost alternative biomarker[2] and trustworthy sign .Many benefits in consuming this in practical life have been found. Principally, after logarithmical conversion, it can accurate for the shortage of a normal spreading. Other important measure is that it is attained by direct calculation and needs no additional budget.

There are limitations which should be well-thought-out beforehand during results analysis. This study was a cross-sectional. This shortage may lead partiality to study, avert from deducing a basis of IL-6 with CAD incidence and degree in obese group. AIP was calculated in hospitalized obese and non obese group with already CAD.

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