Original Article

Comparison Of Epicardial Adipose Tissue Thickness And Anthropometric Measurement In Metabolic Syndrome

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Abstract

Background: Epicardial tissue thickness is component of visceral adipose tissue. Abdominal fat increases with obesity in Metabolic Syndrome & 2D-ECHO is cheaper, non-invasive modality to measure epicardial adipose tissue thickness**.** Present study aimed for comparison of epicardial adipose tissue thickness and anthropometric measurement in patients with metabolic syndrome.

Material & Method: This comparative study was conducted among the patients attending the OPD of Department of General Medicine, AVMCH. Patients were grouped as cases and controls. Study was done over a period of two years on cases i.e hospitalized adults with the diagnosis of metabolic syndrome {The individuals satisfying criteria given by International diabetic Federation} & also on controls i.e patients coming for health check-up which may not fit in criteria of metabolic syndrome in Department of General Medicine, AVMCH. After informed & written consent from the patients, detailed history, clinical assessment & laboratory investigations were done.

Result: The overall mean of age of the participants was found to be 43.57±11.32yrs, among them 39.8% were female and 60.2% were male. Mean central waist circumference, SBP, DBO, TG, FBS, 2D-ECHO long axis (mm), and 2D-ECHO short axis (mm) was found to be significantly higher among the cases compared to control and HDL was found to be significantly lower. There is a significant positive strength of association of central obesity, TG, SBP and DBP with 2D-ECHO long and short axis thickness and negative relation with HDL cholesterol.

Conclusion: The present study documented a significant strength of correlation between epicardial adipose tissue thickness with the anthropometric measurements in patients with metabolic syndrome.

Keyword: ECHO, Obesity, Metabolic syndrome, Insulin Resistance, Epicardial Adipose tissue thickness.

INTRODUCTION

Metabolic Syndrome (MS) consists of constellation of metabolic abnormalities that confer increased risk of cardio vascular disease (CVD) and diabetes mellitus (DM).[1] The IDF[2] (International Diabetic Federation) criteria for diagnosis of metabolic syndrome. Metabolic syndrome is related to multiple cardiovascular risk factor.[3–5]

It has been reported that epicardial adipose tissue (EAT) thickness is associated with metabolic syndrome, T_2DM, atrial fibrillation and coronary artery disease.[6–9] Echocardiographic EAT thickness has been defined as the

thickness of low- isoechoic area on the free wall of the right ventricle in the para-sternal long -axis and short-axis views.[8,9]

The present study aimed to find out correlation of EAT thickness and anthropometric measurement in metabolic syndrome. There is large degree of variation in epicardial adipose tissue thickness among the different ethnic group as confirmed by recent metanalysis on this subject.[10] Hoping to accomplish this, in April 2005, the International Diabetes Federation (IDF) introduced a new concept of Metabolic Syndrome[13] According to two studies on obesity in India the prevalence of metabolic syndrome ranges from 8% in men to 46% in women[14]

MATERIAL & METHOD

This descriptive comparative study which was conducted after getting institutional ethical clearance in AVMCH from October 2020 to October 2022.

The study included Patients attending OPD following Guidelines of International Diabetic Federation Male & Female patients of >18 years of age with 1) Hypertriglyceridemia- TGL level > 150 mg/dl or specific medication. 2) Low HDL Cholesterol- <40mg/dl &<50mg/dl for men & women or specific medication. 3)Fasting plasma glucose- >100mg/dl or specific medication or previously diagnosed Type 2 DM 4)Hypertension- Blood pressure Systolic >130 mm/hg or Diastolic >85mm/hg or specific medication 5)Central obesity- Waist Circumference >102 cm Male & >88cm Female.

The study excluded patients with Coronary Artery Bypass Graft (CABG) Operation, Serious Heart Valve Disease,Acute and Currently Treated Malignancies, Chronic Case with Infection**.**

After informed & written consent from the patients, detailed history, clinical assessment & laboratory investigations were done. All data were collected by the investigator and was analysed statistically using SPSS v21 on windows 10.

RESULTS

In present study, total of 402 patients fulfilling inclusion criteria were included. The mean age of participants was found to be 43.57±11.32yrs, among them 39.8% were female and 60.2% were male and were further divided into cases and controls. The mean age of cases was 46.60±11.98yrs and controls 44.85±9.96yrs, with no significant difference. Similarly, there was no significant gender distribution between the cases and controls. (p>0.05). Similarly, the LDL cholesterol showed a significant positive strength of association with ECHO Long axis (r=0.496. p<0.05) and short axis (r=0.560, p<0.05). HDL cholesterol showed a significant negative strength of association with ECHO Long axis (r=-0.646. p<0.05) and short axis (r=-0.712, p<0.05).

Table 1: Mean comparison of Parameters between the Cases and Controls using t-test

	Case		Control		t-test p-value
	Mean	SD	Mean	SD	
Waist Circumference in cm	109.8	16.5	90.3	9.3	0.001**
SBP in mmHg	157.6	14.0	111.9	8.7	0.001**

DBP in mmHg	94.7	4.8	76.6	4.9	0.001**
TG in mg/dL	174.3	33.0	132.9	14.7	0.001**
HDL in mg/dL	34.7	6.5	50.2	5.8	0.001**
FBS in mg/dL	153.2	31.1	92.8	7.1	0.001**

Table 2: Showing the mean level of 2D-ECHO Parameters between Cases and Control using t-test

	Case		Control		t-test p-value
	Mean	SD	Mean	SD	
2D- ECHO EF (%)	60.4	35.2	60.0	.3	0.872
2D-ECHO Long Axis (mm)	13.3	3.9	7.3	1.7	0.001**
2D-ECHO Short Axis (mm)	10.6	2.9	3.7	1.3	0.001**

Table 3: Correlation of Parameters with 2D-ECHO Measurements among study Participants

		2D- ECHO EF (%)	2D-ECHO Long Axis (mm)	2D-ECHO Short Axis (mm)
Waist Circumference in cm	r	.014	.424**	.492**
	Sig.	.773	.000	.000
TG in mg/dL	r	.036	.496**	.560**
	Sig.	.467	.000	.000
HDL in mg/dL	r	-.003	-.646**	-.712**
	Sig.	.955	.000	.000

DISCUSSION

Metabolic syndrome is also termed as the insulin resistance syndrome or syndrome X. Obesity or abdominal obesity is associated with presence of resistance to the effects of insulin on peripheral blood glucose levels and also altering the fatty acid utilization.

Visceral adipose tissue (VAT) refers to fat cells in the abdominal cavity and includes 'omental, mesenteric retroperitoneal, and perinephric adipose tissue.' Epicardial adipose tissue is a good marker of visceral fat and can be used in routine echocardiographic screening for causes other than CAD. The goal of this study is to correlate the thickness of Epicardial Adipose Tissue Thickness to the severity of coronary artery disease as shown during coronary angiography.

In study by Shetty et al., Mean age at the time of participation in the study was 42.79 ± 15.3 years (range 18-84) and 63.7% were male participants and 36.3% were female patients with male preponderance.[11] On comparison of the variables between the groups, the mean central waist circumference, SBP, DBO, TG, FBS, 2D-ECHO Long Axis (mm), and 2D-ECHO Short Axis (mm) was found to be significantly higher among the cases compared to control and HDL was found to be significantly lower.

In a study by Khurana et al., (2018) to assess the correlation of epicardial fat with severity of the coronary artery disease and metabolic parameters. Patients with increasing degree of coronary artery stenosis have a larger amount of epicardial fat. The EFV cutoff values for the presence of CAD and obstructive CAD are 49.75 and 67.69 mL, respectively, with area under the curve of 0.68 and accuracy of 66 percent. EFV has a relationship with age, weight, and BMI (BMI). EFV was found to be an independent risk factor for the occurrence of CAD in a multivariate study. Higher quantities of EFV are found in patients with greater degree of coronary artery stenosis. EFV correlates with age, weight, and BMI. EFV is an independent risk factor for CAD[16]

In concordance to present study, Karadag et al., discovered a link between low-density lipoprotein-cholesterol (LDL-C) and EAT ($p<0.05$). Findings indicate that EAT-measurement by echocardiography is an effective tool for determining visceral adiposity and should be considered, particularly in advanced age groups.[12] On correlation of the parameters, we found that waist circumference was significantly positively correlated with the ECHO Long axis ($r=0.424$. $p<0.05$) and short axis ($r=0.492$, $p<0.05$).

The association between EAT and anthropometry measurements, notably waist circumference, was extremely significant, as EAT is a component of visceral adipose tissue, which rises in the MetS. There was also a significant relationship with echocardiographic parameters, with a positive relationship between EAT and LA, LV dimension, and RWT. EAT appears to represent the structural alterations in the heart linked with obesity, and our findings are consistent with earlier research[17]

CONCLUSION

The present study documented a significant strength of correlation between Epicardial Adipose tissue thickness with the anthropometric measurements in patients with metabolic syndrome. Also, there is a significant strength of association of Epicardial Adipose tissue thickness with dyslipidaemia and negative relation with HDL cholesterol. The study showed a significant risk of cardiovascular disease among the metabolic syndrome cases.

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