STUDY ON CORRELATION BETWEEN EPICARDIAL FAT WITH LIPID PROFILE

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ABSTRACT

*Background*Epicardial adipose tissue is a type of visceral fat deposited around the heart that is shown to be associated in the development of coronary artery disease.

Aim & Objectives tocorrelate epicardial fat thickness in echocardiography with lipid profile.To compare the epicardial fat thickness with lipidprofile. To assess premature coronary arterydisease. *Methods& Materials*: Body mass index is calculated using formula: Weight in kg / (height in meters)^2. Epicardial fat thickness was measured by 2D echocardiography in Parasternal long axis, Parasternal short axis, Apical 4 chamber windows. Lipid profile was obtained from the participants previously available blood investigation reports.*Result*: Epicardial fat thickness is significantly increased in subjects with dyslipidemia and increased body mass index. *Conclusion*Increasedepicardial fat thicknesscan also be considered as a risk factor for coronary artery disease, In addition with dyslipidemia and obesity.

Keywords: Epicardial Fat, Body Mass Index, Dyslipidemia.

INTRODUCTION

Epicardial fat (EF) has been proposed as a marker of cardiovascular risk. The heart and vessels are surrounded by layers of adipose tissue, which is a complex organ composed of adipocytes, stromal cells, macrophages, and a neuronal network, all nourished by a rich microcirculation [(4).] The layers of adipose tissue surrounding the heart can be subdivided into intra- and extra pericardial fat. Their thicknesses and volumes can be quantified by echocardiography and computed tomography or magnetic resonance imaging, respectively [(4).]

Epicardial fat is a unique adipose tissue located between the myocardium and the visceral layer of pericardium [(1).] Under physiological conditions, Epicardial fat protects and supports the heart to exert its normal function [(1).] Many clinical studies have shown significant associations between increased amounts of Epicardial fat (EF) and coronary artery disease (CAD) [(1).]EF has a variable distribution, being more prominent in the atrioventricular and interventricular grooves and right ventricular lateral wall [(2).]

PATHOPHYSIOLOGY OF EPICARDIAL FAT

The embryological origin of Epicardial fat is same as that of omental and mesenteric adipose tissues, which produces cytokines [(2).] Adipokines are cytokines produced by adipose tissue that regulates glucose-insulin and lipids. Leptin and resistin show greater concentration in epicardial fat and are associated with cardiovascular risk [(2).] Epicardial fat also has paracrine effects. Cytokines and fatty acids are dispersed locally through microcirculation and vasa vasorum due to the anatomical proximity with the coronary arteries and heart [(2).]

LIPID PROFILE

Lipids are circulating as lipoproteins, consisting of unesterified cholesterol, triglycerides, phospholipids, and protein [(5)]

The level of cholesterol plays a vital role in cardiovascular diseases process. A high level of lipids, including cholesterol and triglycerides in the serum, which also termed as hyperlipidaemia, leads to a higher risk of developing atherosclerotic cardiovascular disease (CVD)[(5)] Generally, a lipid profile or lipid panel consists of the following,

- Total cholesterol
- High-density lipoprotein (HDL) cholesterol
- Low-density lipoprotein (LDL) cholesterol
- Triglycerides.

BODY MASS INDEX

Body mass index (BMI, ratio of height and weight, expressed as kg/m^2) is widely used to define overweight and obesity [(7).]

There is a vast amount of data supporting an increased risk of cardiovascular disease (CVD) mortality and reduced survival associated with overweight and obesity[(6).]

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EPICARDIAL FAT WITH CORONARY ARTERY DISEASE

There is an excellent correlation of epicardial adipose tissue (EAT) with visceral adipose tissue as estimated by magnetic resonance imaging (MRI). EAT significantly correlates with the extent and severity of coronary artery disease (CAD), as assessed by coronary angiography [8].

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METHODS AND MATERIALS

This is a cross-sectional study carried out at Chettinad Hospital and Research Institute Kelambakkam, Chennai.

			N	Mean	Std. Deviation	t

This study was approved by the Institutional Ethics Committee and a written informed consent was obtained from all study subjects.

A total of 100 study subjects both genders who attending Master Health Check-up were included. Subjects with pericarditis, pericardial effusion were excluded from the study. Clinical details such as anthropometric measurement (Age, gender, height, weight) of all the study subjects enrolled in the study were obtained by one-to-one interview and the hospital medical records. Body mass index (BMI) was calculated as body weight in kilograms and divided by height squared. Obesity was defined as having a BMI ≥30 kg/m$^{2.}$

Lipid profile [Total Cholesterol (TC), Triglyceride (TG) and High-Density Lipoprotein-cholesterol (HDL-c), Low Density Lipoprotein-cholesterol (LDL-c)] were obtained from Master Health Check-up records, dyslipidaemia was defined as total cholesterol higher than 220 mg/d or triglycerides ≥150 mg/dl.

ECHOCARDIOGRAPHIC MEASUREMENT

Transthoracic echocardiography provides a reliable measurement of Epicardial fat thickness

Echocardiograms were performed with a GE Vivid S5 instrument according to standard techniques, with subjects in the left lateral decubitus position.

Epicardial fat thickness measured on the free wall of right ventricle from the parasternal long-axis and short-axis views since it allows accurate assessment. The measurement was performed at a point on the free wall of the right ventricle where the fat thickness was highest.

Statistical analysis was performed using SPSS Version-21. Normally distributed continuous values were expressed as Mean, standard deviation, frequency, percentage.

Pearson correlation analysis was used for analysis of correlation between EFT and serum lipids. The results with $p < 0.05$ were considered statistically significant.

RESULTS

DEMOGRAPHIC FEATURES

Table: 1 A total 100 participants were enrolled for this study of which (78 were males and 22 were females) Epicardial fat thickness of 0.5cm was considered to be normal.

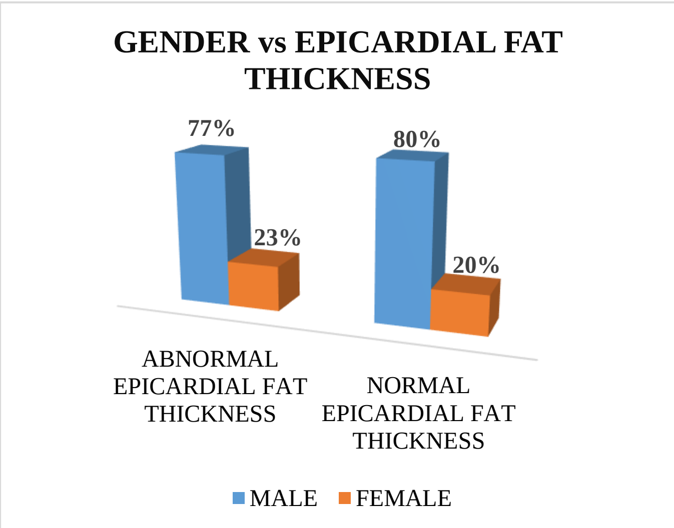

Fig:1 Among 100 participants 70% had

Abnormal Epicardial fat thickness in which

GENDER	Abnormal EFT	MALE	54	.913	.3382	1.34
		FEMALE	16	.794	.1948	
	Normal EFT	MALE	24	.283	.0761	0.05
		FEMALE	6	.333	.0816	
BMI	Abnormal EFT	OBESE	18	1.006	.3404	2.10
		OVERWEIGHT	42	.829	.2680	
		NORMAL	10	.910	.4067	
		TOTAL	70	.886	.3141	
	Normal EFT	OBESE	6	.317	.0753	4.25
		OVERWEIGHT	14	.321	.0699	
		NORMAL	10	.240	.0699	
		TOTAL	30	.293	.0785	

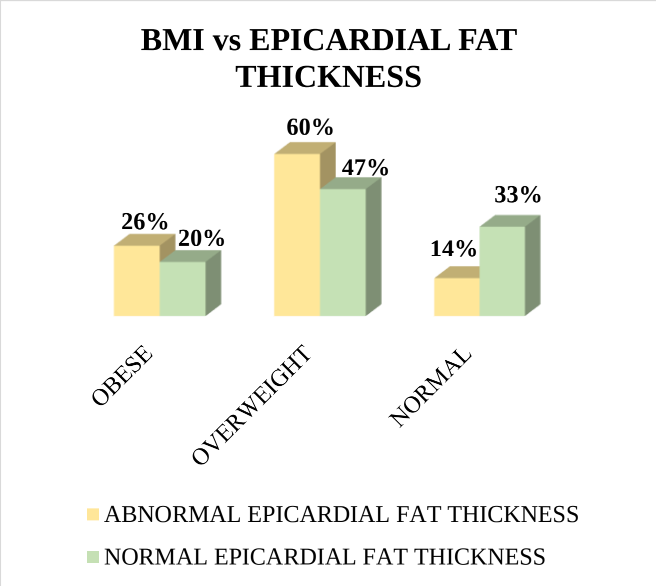

Fig:2 Among 100 participants, 70% had Abnormal Epicardial fat thickness in that 26% obese, 60% overweight and 14% normal with BMI, 30% had Normal Epicardial fat thickness in that 20% obese, 47% overweight and 33% Normal with BMI.

Table:2Represents the Lipid Profile with Epicardial Fat Thickness

		Mean	Std. Deviation	N
LIPID PROFILE WITH ABNORMAL EFT	EFT	.886	[illegible]	[illegible]
	TC	184.514	[illegible]	[illegible]
	TG	145.871	[illegible]	[illegible]
	HDL	36.014	[illegible]	[illegible]
	LDL	132.586	[illegible]	[illegible]
LIPID PROFILE WITH NORMAL EFT	EFT	.293	[illegible]	[illegible]
	TC	173.167	41.2721	30
	TG	111.233	59.9561	30
	HDL	46.133	14.7595	30
	LDL	103.600	42.1341	30

Among 100 participants, 70% had Abnormal Epicardial fat thickness in that 26% obese, 60% overweight and 14% normal with BMI, 30% had Normal Epicardial fat thickness in that 20% obese, 47% overweight and 33% Normal with BMI.

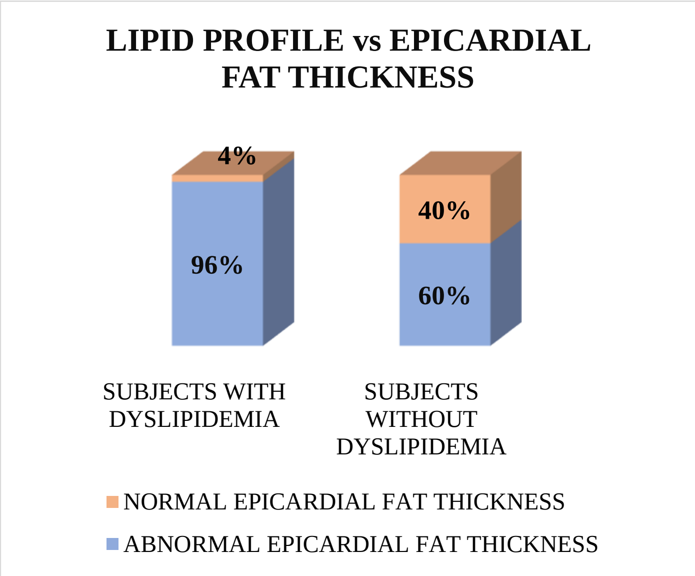

Fig:3 96% of participants with increased epicardial fat thickness had dyslipidemia

Table:3 Represents the correlation of Abnormal Epicardial Fat thickness with Lipid Profile

		EFT	TC	TG	HDL	LDL
EFT	Pearson Correlation	1	-.031	.327**	-.390**	.285*
	Sig. (2-tailed)		.801	.006	.001	.017
	N	70	70	70	70	70
TC	Pearson Correlation	-.031	1	-.006	.179	.549**

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	Sig. (2-tailed)	.801		.964	.138	.000
	N	70	70	70	70	70
TG	Pearson Correlation	.327**	-.006	1	-.310**	.339**
	Sig. (2-tailed)	.006	.964		.009	.004
	N	70	70	70	70	70
HDL	Pearson Correlation	-.390**	.179	-.310**	1	-.010
	Sig. (2-tailed)	.001	.138	.009		.936
	N	70	70	70	70	70
LDL	Pearson Correlation	.285*	.549**	.339**	-.010	1
	Sig. (2-tailed)	.017	.000	.004	.936	
	N	70	70	70	70	70

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

DISCUSSION

At present, magnetic resonance imaging (MRI) is accepted as a gold standard method for measuring EFT. However, in 2003, Iacobellis et al. showed that echocardiographic measurements of EFT had good correlations with epicardial fat measured by MRI. [9] Findings could introduce a new applicable and readily accessible risk assessment method of atherosclerosis that offers good reliability and reproducibility, as well as low cost and non- invasiveness. [9] The present clinical study suggests that epicardial fat thickness measured by Transthoracic Echocardiography is increased in the presence ofdyslipidaemia and also found that the mean EFTis 0.9cm in male and 0.7 cm in female.

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There is an association between obesity and adaptive modifications in cardiac morphology and function. (10) EAT to be closely associated with derangements in cardiac morphology and function. Autopsy studies have shown a parallel increase in LV mass with increasing EAT,which was noted to be independent of ischemia. Echocardiography data also show a correlation between EAT mass and LV mass. (10)
The present study suggest that increased epicardial fat thickness as measured by echocardiography also showed good correlation with high body mass index.
A recent meta-analysis showed that EAT may be an effective marker for the prediction of coronary heart disease. (11)
The present study shows that there is a significant correlation between increased epicardial fat thickness, dyslipidemia and Body Mass Index.
Epicardial fat can also be considered as a Risk factor forcoronary artery disease similar to dyslipidemia and increased body mass index.

CONCLUSION

Our study suggested that participants with increased epicardial fat thickness has dyslipidemia and increased body mass index, Epicardial fat thickness can also be considered has risk factor for coronary artery disease in addition with dyslipidemia and obesity.
Measuring epicardial fat thickness in 2D can be used in routine clinical practice.

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