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Original Research Article

"To Study Association of Epicardial Fat Thickness Evaluated by 2Dechocardiography with Type II Diabetes Mellitus"

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ABSTRACT

Background: Epicardial fat tissue (EFT) is the visceral fat that lines the coronary arteries between the pericardium and the myocardium. It has been found that EFT increases are closely related to diabetes mellitus (DM).

Aim and Objectives: Association of Epicardial Fat Thickness evaluated by 2Dechocardiography with Type II Diabetes mellitus and hence association of Epicardial Fat thickness with Insulin Resistance.

Material and Methods: We included data on EFT in a DM patient group and a non-DM control group. Biochemistry profile and lipid profile test was done to compare the mean value in diabetic and non-diabetic individuals. We then assessed the effect of DM on EFT by echo test. All statistical analyses were performed using Graphpad software.

Results: A total of 100 diabetic and 100 non diabetic induvial were included in the analysis. Compared with the control group, DM patients had significantly higher EFT value than non-diabetic individuals.

Conclusion: The results of our study indicate that DM patients exhibit more EFT than non-DM patients, providing new ideas for diagnosis and treatment of DM in the future, and for conducting DM research in the future. There may be an important relationship between the EFT of diabetics and non-DM patients and the incidence of cardiovascular diseases. All data were based on a single measurement and correlation study was not established. Further follow-up studies are needed after drug intervention to attain more accurate findings.

Keywords: BMI, KFT, DM, EFT , LDL , TG , AST , ALT

1. Introduction

An echocardiogram was performed on each subject utilizing Philip's HD7XE echocardiography machine. The echocardiographic study included recording of 3 cycles of two dimensional parasternal long and short axis views. Epicardial fat thickness was measured on the free wall of the right ventricle from both parasternal long and short axis views, using the aortic annulus as anatomic reference for the parasternal long axis view and the papillary muscles for the short – axis view. The value was averaged and a mean calculated which is the thickness of epicardial fat.

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2. Material and Methods:

We included data on EFT in a DM patient group and a non-DM control group. Biochemistry profile and lipid profile test was done to compare the mean value in diabetic and non-diabetic individuals. We then assessed the effect of DM on EFT by echo test. All statistical analyses were performed using Graphpad software.

Sample size:
Case. 100 Diabetic patient
Control. 100 normal individuals

Inclusion Criteria:

- BMI>25, Case-Type2 DM newly detected or known cases or On Anti-diabetic treatment. Control- Non diabetics

Exclusion criteria:

- Type I DM, Critical ill patients, Associated comorbid illness like hypertension, congestive cardiac failure, liver disease, renal disease and Smoking, Alcoholism

PROCEDURE PLAN:
We included data on EFT in a DM patient group and a non-DM control group. Biochemistry profile and lipid profile test was done to compare the mean value in diabetic and non-diabetic individuals. We then assessed the effect of DM on EFT by echo test. All statistical analyses were performed using Graphpad software.

DATA COLLECTION AND METHODS:
A pretested questionnaire was applied to obtain detailed relevant information of SAM, Lipid profiling & Echo test.

STATISTICAL ANALYSIS: Data was collected and managed on an excel work sheet. All values are expressed as mean. Data were calculated by appropriate statistical test.

3. Results:

A total of 100 diabetic and 100 non diabetic induvial were included in the analysis. Compared with the control group, DM patients had significantly higher EFT value than non-diabetic individuals.

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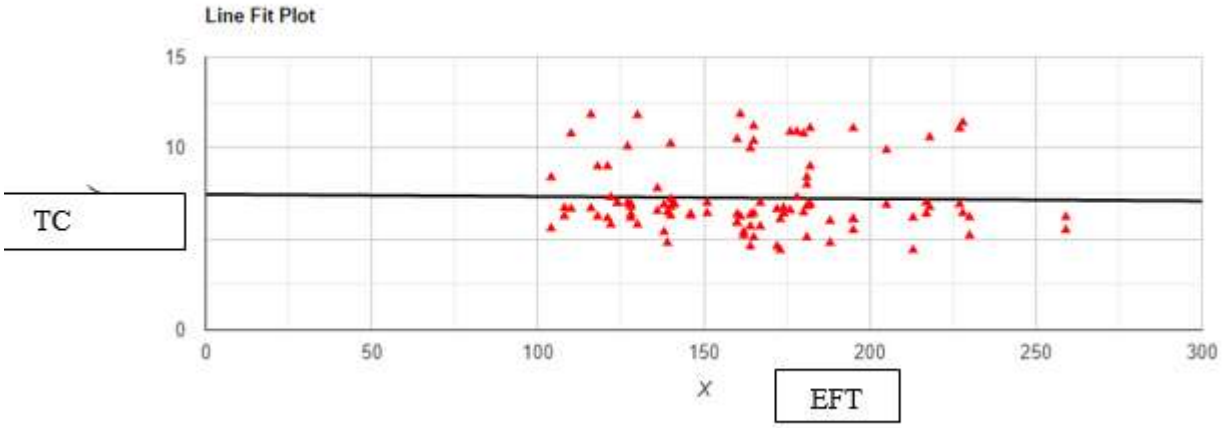

fig 1- EFT versus TC in control. Pearson correlation indicated that there is a non-significant very small negative relationship between X and Y, (r(98) = .0225, p = .824).

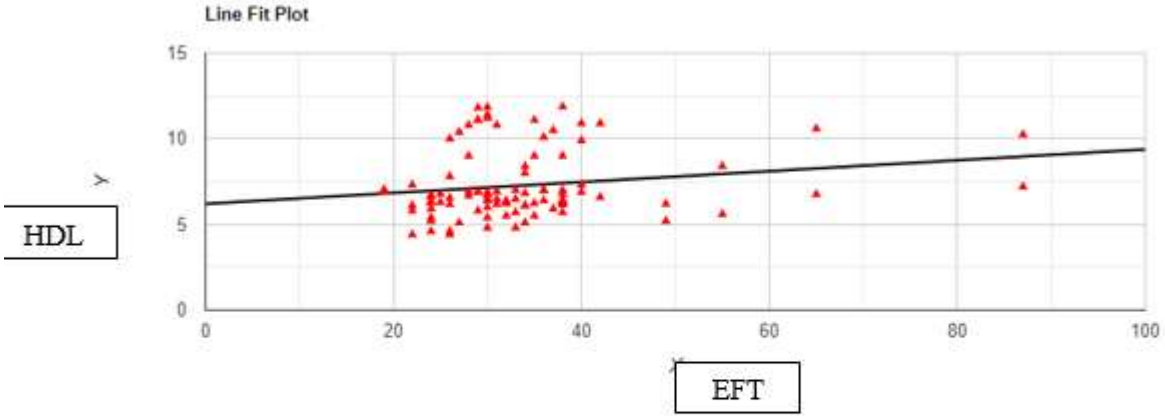

Fig. 2-:EFT versus HDL in control. Pearson correlation indicated that there is a non-significant small positive relationship between X and Y, (r(98) = .183, p = .069).

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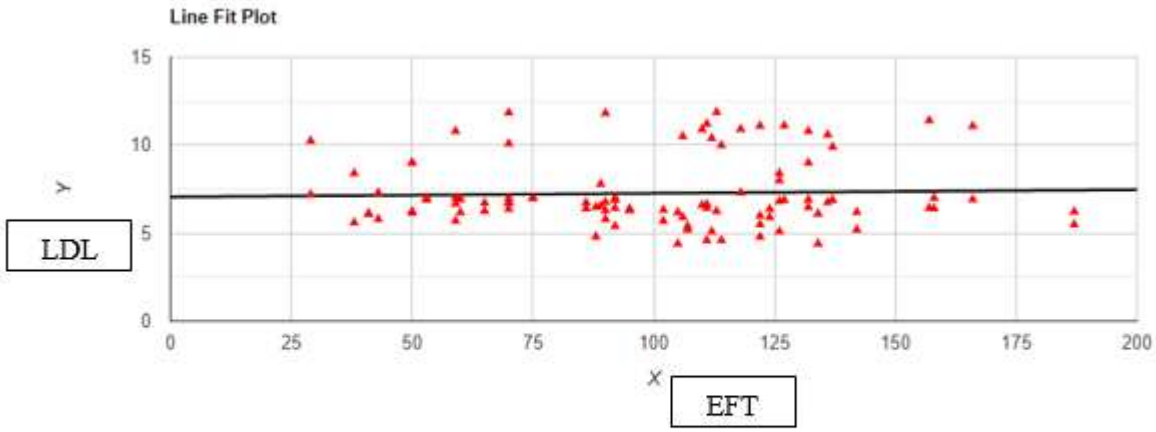

Fig.3-: EFT versus LDL in control. Pearson correlation indicated that there is a non-significant very small positive relationship between X and Y, (r(98) = .0375, p = .711).

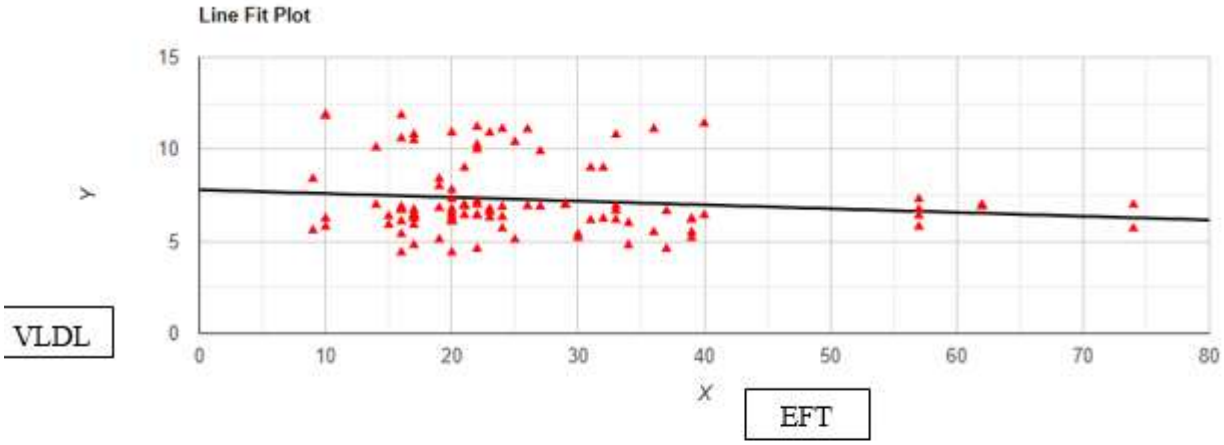

Fig.4-: EFT versus VLDL in control. Pearson correlation indicated that there is a non-significant very small negative relationship between X and Y, (r(98) = .138, p = .170).

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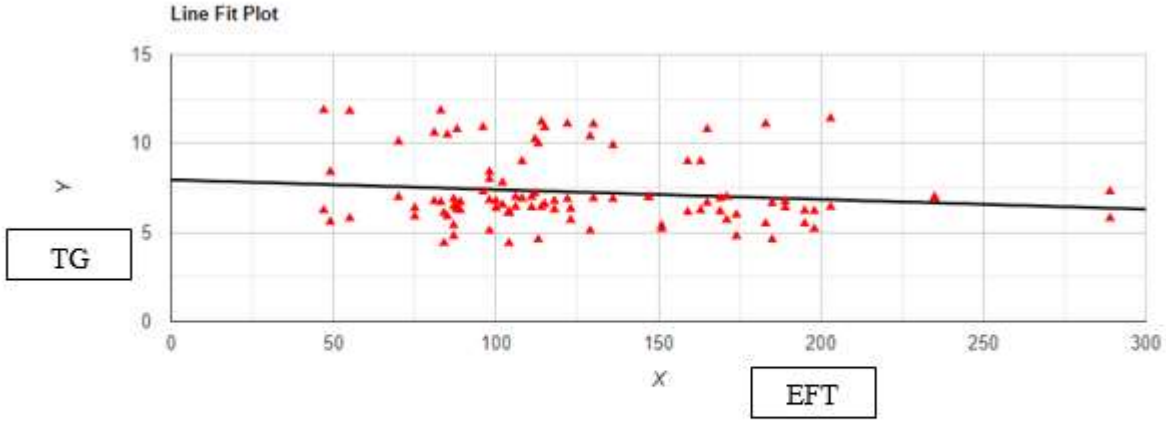

Fig.5-: EFT versus TG in control. Pearson correlation indicated that there is a non-significant very small negative relationship between X and Y, (r(98) = .138, p = .172).

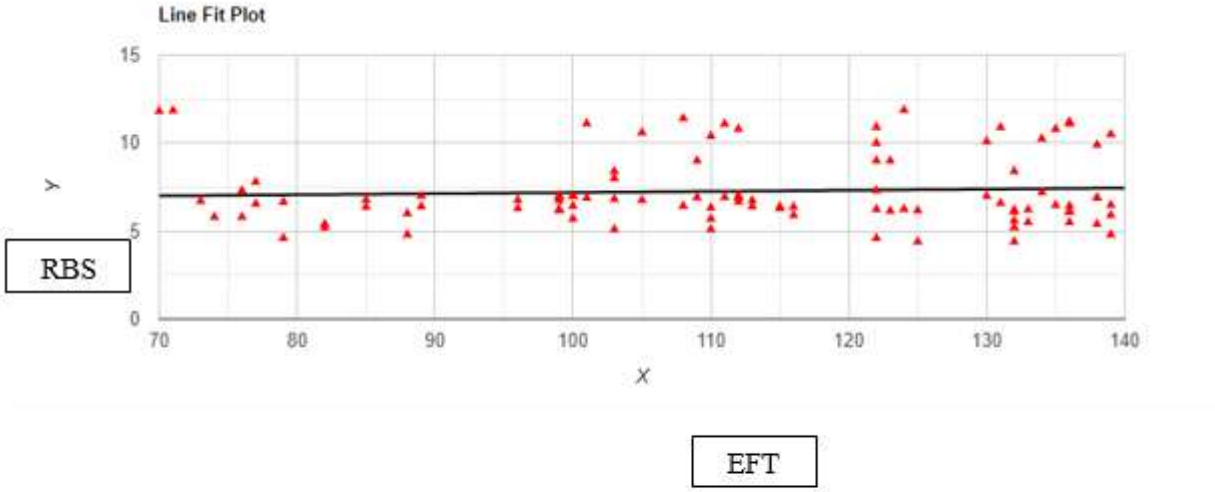

Fig. 6-: EFT versus RBS in control. Pearson correlation indicated that there is a non significant very small positive relationship between X and Y, (r(98) = .0635, p = .530

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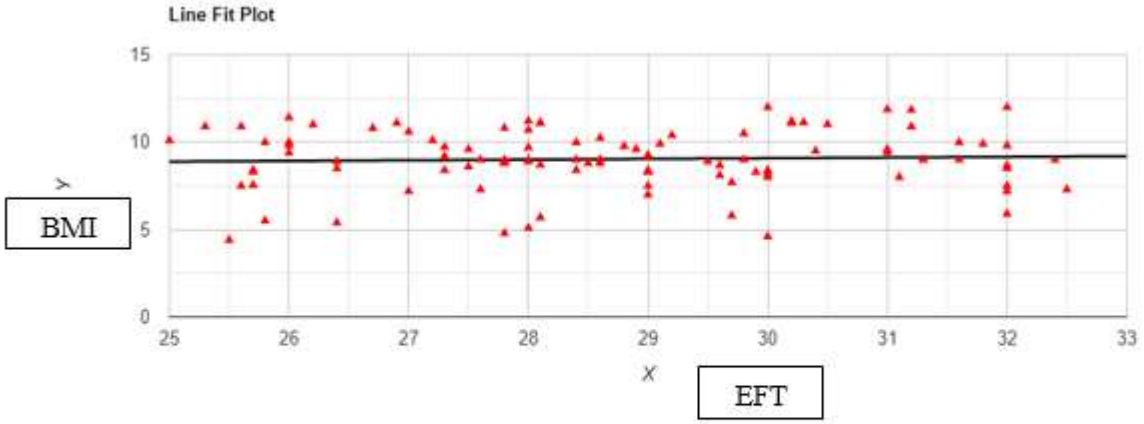

Fig.7-: EFT versus BMI in case. Pearson correlation indicated that there is a non-significant very small positive relationship between X and Y, (r(98) = .0456, p = .652).

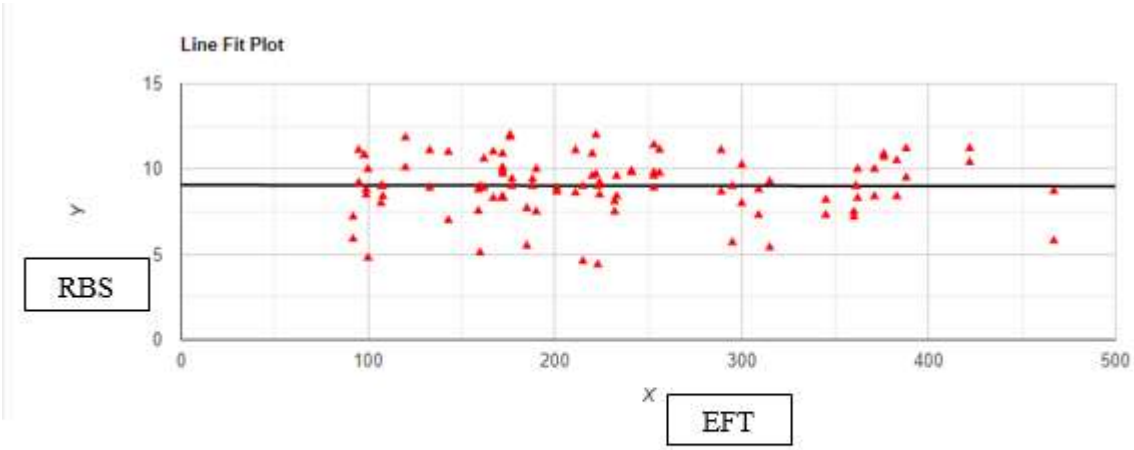

Fig. 8-: EFT versus RBS in case. Pearson correlation indicated that there is a non significant very small negative relationship between X and Y, (r(98) = .00813, p = .936).

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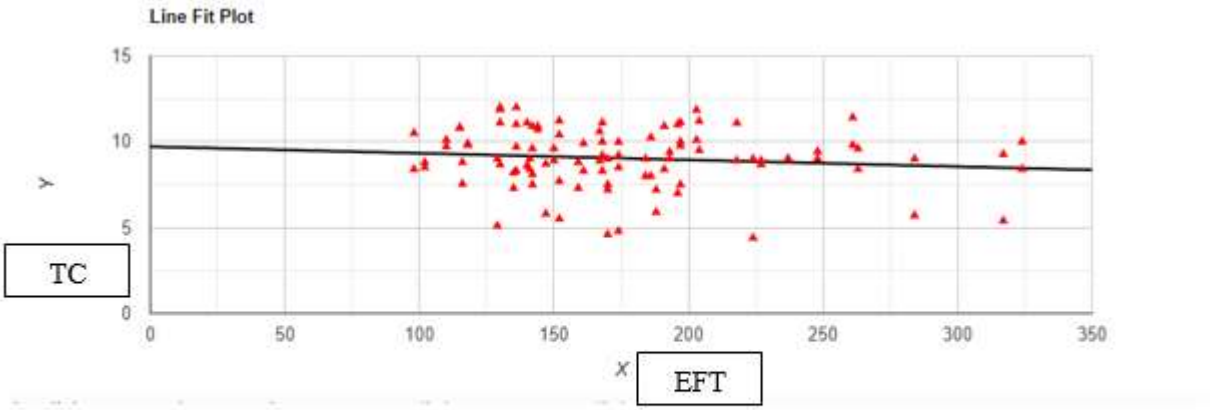

Fig.9-: EFT versus TC in case. Pearson correlation indicated that there is a non significant very small negative relationship between X and Y, (r(98) = .119, p = .237).

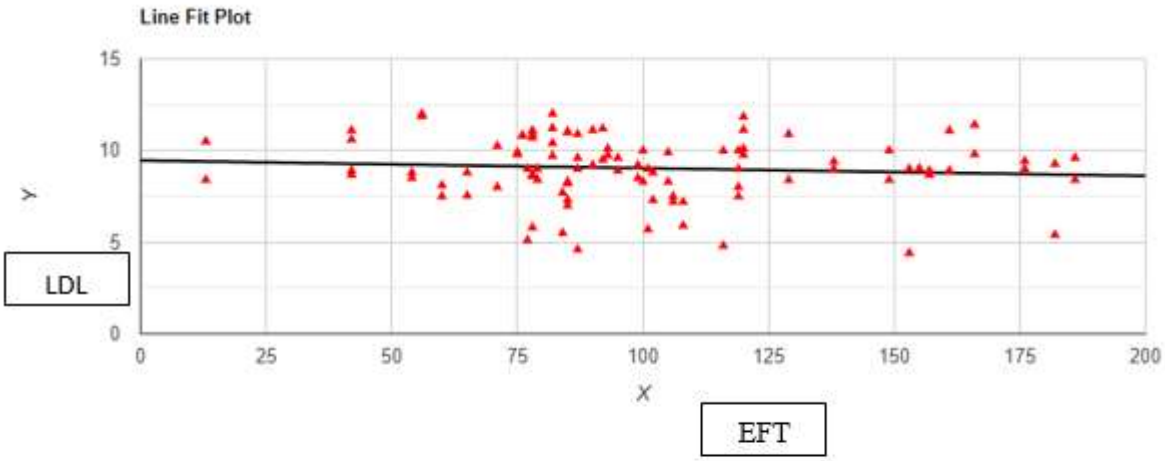

Fig. 10. EFT versus LDL in case. Pearson correlation indicated that there is a non-significant very small negative relationship between X and Y, (r(98) = .0941, p = .352).

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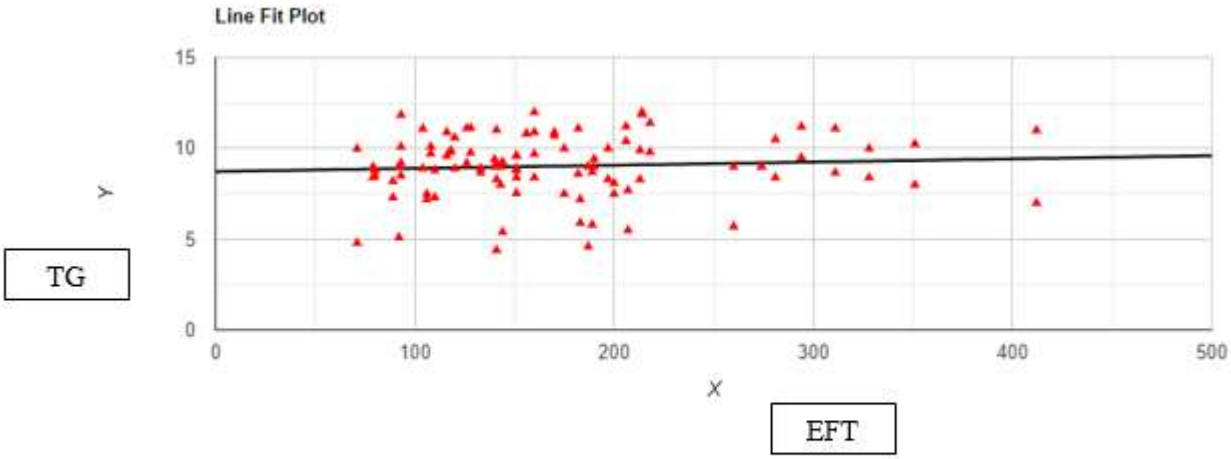

Fig. 11. EFT versus TG in case. Pearson correlation indicated that there is a non-significant very small positive relationship between X and Y, ($r(98) = .0771$, $p = .446$).

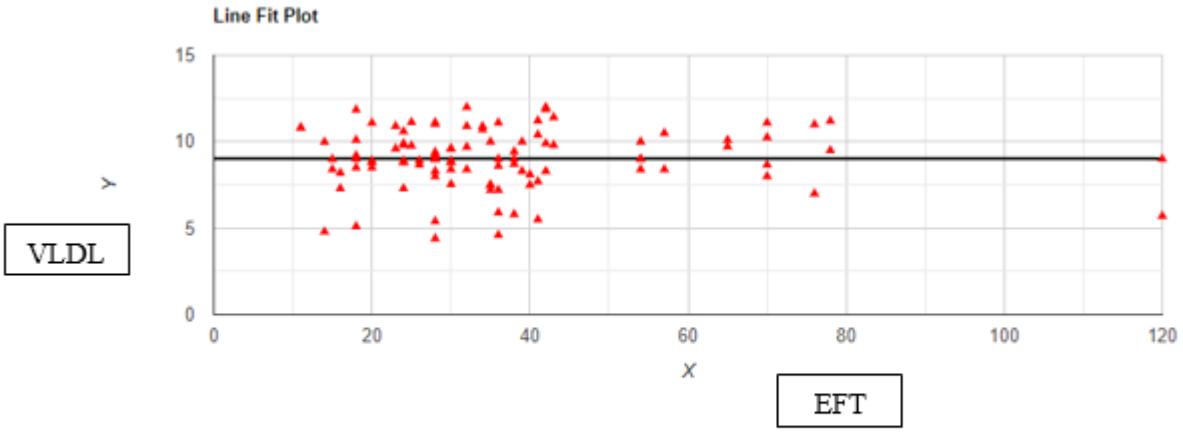

Fig. 12-: EFT versus VLDL in case. Pearson correlation indicated that there is a non significant very small negative relationship between X and Y, (r(98) = .00197, p = .984).

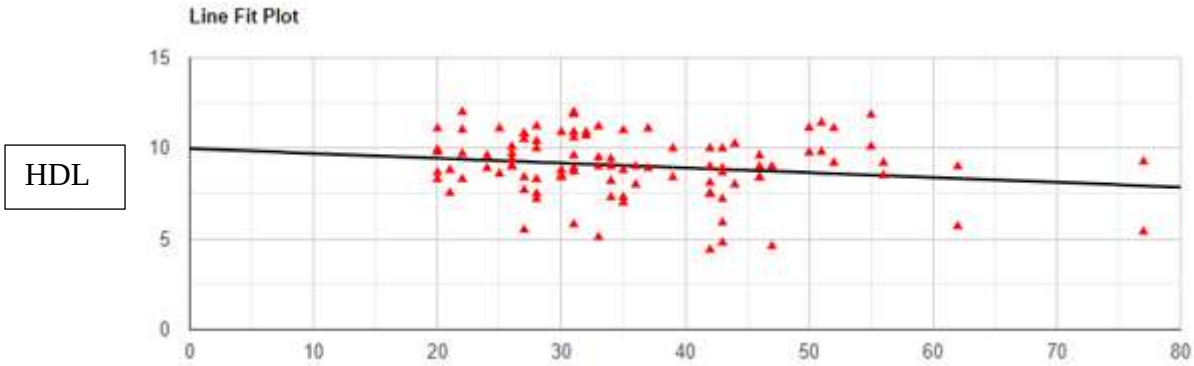

Fig.13. EFT versus HDL in case. Pearson correlation indicated that there is a non-significant very small negative relationship between X and Y, (r(98) = .187, p = .063).

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Parameters	Case Mean± SD	Control Mean± SD	P value
RBS(mg/dL)	230±96.38	112±19.8	0.001
TC (mg/dL)	176.36±51.89	163.78±35.92	0.0476
HDL (mg/dL)	35.8±11.86	33.44±11.3	0.1513
LDL (mg/dL)	101.16±37.78	99.82±35.84	0.7972
VLDL (mg/dL)	36.76±19.81	26.2±13.27	0.0001
TG (mg/dL)	172.92±74.74	125.66±49.04	0.0001
S Bil(mg/dL)	0.81±0.44	0.92±0.64	0.158
AST U/L	39.62±24.58	38.7±20.13	0.7724
ALT U/L	54.42±30.12	51.55±26.61	0.476
Urea(mg/dL)	121.41±49.05	31.54±7.17	0.0001
Creatinine(mg/dL)	3.45±1.69	0.77±0.17	0.0001
EFT mm	9.03±1.68	7.26±1.96	0.0001

Table-1-: Lipid profile and biochemistry profile of case Vs. control

4. Discussion and detailed analysis of result:

In present study, A total of 100 diabetic patient (56 males and 44 females with a mean age of 28.81±1.98 and 28.62±1.99 years respectively) and 100 controls (55 male and 45 female with mean age 28.99±1.98 and 28.42±2.12 years respectively) of healthy individuals were studied. BMI were calculated for both case (28.73±1.98) and controls (28.68±2.07). Recruited case were belongs to rural (69%.) and urban (31%) settings while control were 76% and 24%. 41%. 41% patient were presenting hypertension while 40% control were reported with hypertension. The study cases (45%) were belonged to lower socioeconomic class holding the BPL card while 71% control were belong to lower socioeconomic group. The mean value of EFT in case and control was 9.0±1.68 mm and 7.26±1.96 mm respectively and differences was statistically significant (p=0.0001). The mean random blood sugar values for the cases and controls were 230.0±96.38 mg/dL and 112.0±19.8 mg/dL respectively and the differences were statistically significant (p =0.001) while their total cholesterol values were 176.36±51.89 mg/dL and 163.78±35.92 mg/dL respectively and

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difference was not statistically significant. A study of Singh et al. shows a positive correlation with body mass index, blood pressure, fasting plasma glucose HBA1c, HOMA IR and Serum triglyceride level with epicardial fat thickness.[1] The mean values of HDL in cases and controls were 35.8±11.86 mg/dL and 33.44±11.3 mg/dL respectively and the difference was statistically not significant (p=0.15). The mean values of LDL were 101.16±37.78 mg/dL and 99.82±35.84 mg/dL in the cases and controls respectively and the differences were not statistically significant (p =0.79). The mean values for VLDL and TG were 36.76±19.81 mg/dL and 172.92 ±74.74 mg/dL for cases and 26.2±13.27 mg/dL and 125.66±49.04 mg/dL for controls and both were statistically significant (p = 0.0001). A significant increase in EFT was observed in chronic systemic inflammation, such as obesity and hyperlipidemia. It has been suggested that it is involved in abnormal lipid metabolism in the body.[2,3] Abnormally increased EFT can secrete a variety of bioactive substances and excessive fatty acids, which can lead to systemic inflammation, insulin resistance, abnormal blood lipid indexes, such as TC and TG, and ultimately lead to DM, metabolic syndrome and atherosclerosis.[4,5] Yingrui et al. evaluated BMI, LDL, HDL, TC, TG, and systolic blood pressure with relation to EFT and found significant relation of TC and TG with EFT.[6] Chun et al. found that there was a significant correlation between left ventricular EFT thickness and the prevalence of diabetes in Korean men.[7] In the studies by Bouchi et al. and Sato et al., the SGLT-2 inhibitors Dapaglifozin and Luseoglifozin both improved systemic inflammation and were used for EFT, thereby reducing the EFT volume of DM patients and thus reducing the risk of cardiovascular disease.[8,9] The mean value of serum bilrubin in case was 0.81±0.44 mg/dL and 0.92±0.64 mg/dL among the controls. This value was not statistically significant (p = 0.004815). The mean value of AST was 39.62±24.58 U/L and 38.7±20.13µl in cases and controls respectively and the differences were not statistically significant (p= 0.77). The mean values of ALT in cases and controls were 54.42±30.12 U/L and 51.55±26.61 U/L respectively and the difference was not statistically significant (p=0.47). The mean values for Urea in case and control was 121.41±49.05 mg/dL and 31.54 ±7. 17 mg/dL respectively and the difference was statistically significant (p=0.0001). In a study showing correlation of epicardial fat with anthropometric measurements in Indians done by Goel A et al, [10] showed that epicardial fat thickness correlated well with weight. In a study done by Iacobilis et al[11] and Mustelier et al[12] very good correlation between epicardial adipose tissue and waist circumference, diastolic blood pressure, fasting plasma insulin, LDL cholesterol was found. [11] In a study done by Yorgun H et al, [14] the mean epicardial fat thickness (EFT) was significantly increased in patients with metabolic syndrome (MetS) compared in those without it. The mean value of serum creatinine in case and control was 3.45±1.69 mg/dL and 0.77±0.17 mg/dL respectively and difference was statistically significant (p =0.0001). The mean value of EFT in case and control was 9.03±1.68 mm and 7.26±1.96 mm respectively and difference was statistically significant (p =0.0001). Detailed parameters are given in **table no.1**. A study of Yingrui et al. also reported that the amount of EFT is significantly higher in DM patients than in non DM patient.[6]Epicardial fat thickness was found to be a strong predictor of subclinical atherosclerosis.[14] Correlation of EFT with BMI,RBS,TG,TC,HDL,LDL,VLDL, S.bi., creatinine and urea were analyzed through *Pearson correlation coefficient. Result* showed that there was no significant correlation between EFT and lipid parameters, LFT,KFT in DM cases/controls. Details are given in **fig. no**.1-13

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5. Conclusion

The results of our study indicate that DM patients exhibit more EFT than non-DM patients, providing new ideas for diagnosis and treatment of DM in the future, and for conducting DM research in the future. There may be an important relationship between the EFT of diabetics and non-DM patients and the incidence of cardiovascular diseases. All data were based on a single measurement and correlation study was not established. Further follow-up studies are needed after drug intervention to attain more accurate findings.

6. Reference

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